The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. V. NOVEMBER 12, 1921 No. 126

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, P.O.O.'s, and Postal Orders should be made payable to Benn Brothers, Ltd.

Editorial & General Offices—8, *Bouverie Street, London, E.C.4.*

Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines).

Phosphate Supplies

THE new volume issued by the Imperial Mineral Resources Bureau in the series dealing with the mineral industry of the British Empire and Foreign Countries gives a very complete survey of the phosphate supplies of the world, with statistical and technical information relative to production, consumption, and value for the war period 1913-1919. We hope to notice it at greater length later, but for the present a few notes must suffice. The chief source of phosphates is the United States. France, with the colonies of Algeria and Tunis, takes second place, but the quality is of lower grade than the best American "land-pebble" phosphates. Although Europe has very few phosphate deposits of importance, the British Empire possesses potential resources of considerable magnitude. Egypt has extensive deposits; in the Pacific Islands and those of the Indian Ocean there remain large reserves of high-grade rock; both Australia and South Africa have considerable areas yet to be exploited; Canada formerly produced large quantities of apatite, and still has considerable resources of this mineral.

During the war the phosphate-mining industry throughout the world suffered severely. This was particularly the case with the Florida "hard-rock" material, the greater part of which is mined for export. The decline is attributed principally to lack of transport facilities and inability to obtain adequate quantities of sulphuric acid, owing to the fact that large amounts were used in the manufacture of munitions. In the period immediately preceding the war, production had attained large dimensions, and there was an increasing demand. The tendency, however, was for the production to outstrip the demand, seeing that for some period before 1913 the trend of prices had been steadily downward. According to good authorities production had risen from about 4½ million tons in 1907 to about 7 million tons in 1913, the figures from year to year showing a progressive increase. This great expansion in production was most marked in Tunis and the United States, but the Pacific Islands also showed a very considerable increase in output during that period. From 1913 to 1917 production declined, and though the figures beyond the latter year are not available, there is little reason to expect an improvement.

At the close of the period covered by this report (December 31, 1919), the world was suffering from a serious shortage of phosphate resulting from the rapid falling off of production. The United Kingdom did not suffer to the same extent as other countries, as special efforts were made to secure supplies, but other European countries, especially France and Germany, felt it severely. As regards prices, the year 1913 is regarded as the low-water mark. The price of the 70 per cent. grade of land-pebble was then approximately $3.60 per ton; by the end of 1919 it was $7.35. In the intervening years prices fluctuated considerably. After the Armistice famine conditions prevailed in the phosphate market, and consequently prices rose very rapidly.

A Welcome Reference Book

THE "well-informed" man is not necessarily the one with an exceptional memory, but he who knows exactly where to lay his hand on the precise information he requires. The modern idea of mind-training has much to recommend it, but the more one considers the range of the realms of science—or even one particular branch of science—the more one appreciates the fallibility of attempting to become mentally omniscient. It is inevitable, therefore, that most of us should have to rely very largely on the auxiliary assistance provided by a first-class reference library of modern books and periodicals. Private libraries, however, may be by no means complete or up to date;

and in times such as the present, when neither technical theory nor practice shows any signs of stability, there is the risk of being misled by information not strictly authoritative. In this country in the past the student or the man of maturer knowledge has had no complete means of knowing what books have been published upon subjects of particular interest to him, and there is a risk that he may gain his impressions from an indifferent or careless writer. Although to-day the standard of accuracy has vastly improved, it is a wise precaution to safeguard oneself by having more than one author's opinion on any particular subject.

We refer to this matter mainly in view of the fact that the British Science Guild has recently rendered what may almost be described as a national service by arranging for the collation of the names of books dealing with science in all its branches, and for the publication of the results in a most accessible form. The volume is given the title of "A Catalogue of British Scientific and Technical Books"; it consists of nearly 400 pages of carefully classified and indexed matter, and the cost is 10s. There are forty-nine main groups, which are subdivided into over 460 sub-classes. So far as chemistry is concerned, we note that primarily the subject is arranged under two main headings, viz., "Chemistry" and "Applied and Industrial Chemistry," the former covering the pure principles and being divided into eleven sub-headings, while the latter is arranged into no fewer than twenty-nine subsidiary groups. In this manner one is able immediately to turn to the whole of the literature published in book form on any specific subject, and the references are so up to date that volumes which we ourselves have only recently received are included. The classification, moreover, is a model of scientific orderliness, for full details of each book are given, as well as the name of the author, the size, date of last edition, number of pages, and price. A committee of sixteen, with Sir Richard Gregory as chairman, was responsible for the collection and preparation of the material. The volume is one which has been far too long delayed; it should be of inestimable value in promoting the use of accurate knowledge, and must obviously be an important factor in furthering the development of education. In brief, it may be described as the foundation-stone of the modern technical library.

The Prevention of Corrosion

THE corrosion of structural materials is a subject with which the chemical engineer in particular is always face to face, for in the majority of instances he has to deal with atmospheres of a comparatively virulent nature. In general, it is difficult to convince the plant contractor of the importance of providing for the prevention of corrosion in as effective a manner as possible for the reason that once his plant is erected and handed over the matter has more or less ceased to interest him. Accordingly, it is the works manager upon whom ultimate responsibility rests. The selection of the material itself is an important item, but as this very seldom comes within the province of those who have eventually to operate plant or take care of structures the main point of interest lies in the modern preventive measures which may be employed.

In general practice with ordinary materials of construction—for instance, steel—corrosion may be counteracted (*a*) by the use of inhibiting agents such as special paints, (*b*) by protecting with a film of oxide, (*c*) by covering with some other metal such as zinc, or (*d*) by covering with some non-drying coating of the nature of a grease or slush. Some short time ago Mr. W. T. Becker pointed out before a meeting of the American Chemical Society that small machine parts must nearly always be protected by means of the last-named substances, and a great deal of research has been conducted in order to determine the most suitable materials. The two sources of trouble in this class of materials are found to be cracking if the object is cooled too much, and liquefaction of the grease if the object becomes too warm. The best test for the efficacy of greases, however, is to coat a test-piece in the ordinary manner, and then to suspend it in fumes of hydrochloric acid, when defects will quickly become apparent.

We have referred to the subject of grease utilisation owing to the fact that a chemical engineer with whom we were recently discussing corrosion pointed to his experience in a building in which the operations conducted necessitated the intermittent escape of a heavy smoke composed partly of the volatile products evolved from coal. He noticed that the steel roof trusses of the building were covered with a thick deposit of a greasy carbon-like character, but that when this deposit was removed the steelwork gave no indication of corrosion. Later, the whole of the deposit was scraped off and paint applied; but the paint, instead of protecting the steel, peeled off almost immediately, with the result that corrosion began to appear. It was eventually decided to permit the carbon-like deposit to collect again and to remain undisturbed, and examination of the steel at a later date showed that corrosion had been permanently checked. The incident is a useful example of the utility of greasy deposits under conditions which are not appropriate so far as ordinary painting is concerned.

Consumers Only

THE Board of Trade, in a decision on a point raised by the Chemical and Dyestuff Traders' Association, announces that the Licensing Committee have laid it down as a general rule that any application for a licence to import a particular dyestuff, based solely on a difference in price between the British and the foreign product, can be considered only when made by the actual consumer concerned. This seems to be in accord with the views of the Colour Users' Association published last week, and it definitely rules out merchants from this class of business. The Board of Trade regards the actual consumer as the only person in a position to furnish evidence as to the effect of any difference in price on his total cost of production, and thus to show whether or not the difference places him in an unduly disadvantageous competitive position. In the particular case under discussion the disparity in prices is certainly marked, for the original merchant applicant quotes his own selling price of the particular dyestuff (probably German) as 3s. 3d. per lb., whereas the most favourable terms quoted by British makers would not allow him to sell at less than 11s. If the figures are correct, they represent a heavy tax on the home consumer, but it must be remembered that the purpose of the

Act is to prevent cheap foreign dyestuffs from capturing the British manufacturer's home market, and its administrators cannot secure that end without employing the necessary means

Our Technical Books Advisory Service

THE first few weeks' working of this service (particulars of which were announced in THE CHEMICAL AGE of October 8) has clearly shown that its establishment satisfies a very definite need. Following the appointment by us of an expert who has made a special study, over a long period of years, of chemical technical literature, and whose knowledge and experience in this respect is unrivalled, we have received inquiries which, both by their number and by their variety, indicate unmistakably the difficulties experienced by a considerable number of our readers in finding the books just suited to their purpose. This is the age of technology, and there can be no greater aid to progress and efficiency than a knowledge of the most up-to-date literature on a given subject; but it is impossible for a busy man, without a tedious search through innumerable catalogues, to discover the book which best gives him the information he requires. It is the object of our Advisory Service to furnish expert and rapid assistance in this direction, and we are happy to find that its establishment has met with so ready a welcome.

"Modern Gasworks Practice"

ONE of the finest text-books yet issued by the proprietors of THE CHEMICAL AGE through their Technical Publications Department is the second edition of Mr. Alwyne Meade's "Modern Gasworks Practice," which is just out of the press. Published originally in 1916, the work was immediately recognised as the indispensable authority on the subject, and it has continued to hold that place unchallenged. So steady has been the demand that for some time it has been out of print. The changes which the technique of gasworks practice have undergone since the issue of the first edition amount, to quote the author's term, to an "upheaval," and the work has now been entirely rewritten and greatly enlarged. It consists of 876 pages, with 500 illustrations and an index containing 2000 references. The published price is 55s. The advance demand for the book is exceptionally heavy, and early application to the publishers, Benn Brothers, Ltd., is advised. In due course we hope to publish a fuller review of the book.

Key Industries List Appeals

IT seems probable that the referee appointed to hear complaints under the Safeguarding of Industries Act will be free from any fear of unemployment once the flood which is now beginning really sets in. This week the British Cellulose and Chemical Manufacturing Company give notice of objection to the exclusion of calcium carbide from the list, under Part I, while the Incandescent Mantle Manufacturers' Association similarly complain that incandescent gas mantles have not been included. These cases promise to turn on the inevitable conflict between two points of view—the manufacturer's and the merchant's. The hearings should provide some interesting evidence, but whether they will be public is not yet known.

Points from Our News Pages

Mr. A. A. Pollitt, M.Sc., contributes a special article on "The Colloidal State and Colloidal Terminology" (p. 586).

Dr. John Waddell, Queen's University, Kingston, Canada, points out defects and suggests improvements in our trading methods with Canada (p. 591).

Our special correspondent, in his second article on "Germany Seven Years After," describes some of the effects of the downfall of the mark (p. 589).

Some interesting opinions on the effect of different methods of preparation on the behaviour of plantation rubber in the factory were advanced in Manchester on Monday by Dr. H. P. Stevens (p. 595).

Dr. H. J. Bush, in a lecture before the Manchester Section of the Society of Chemical Industry, discusses the plant necessary for electrical precipitation, and gives examples of existing installations (p. 592).

Mr. E. V. Evans announced at the opening meeting of the London Section (S.C.I.) that arrangements had been made for joint meetings with the Chemical Industry Club and the Chemical Engineering Group. (p. 596).

Professor G. T. Morgan (Birmingham University) explained in three papers read at Birmingham on Monday, the results of important research work in dyeing carried out by himself and colleagues (p. 594).

The subjects discussed at the last meeting of the Society of Public Analysts included "The Testing of Foodstuffs for Vitamins" (p. 598).

A representative meeting of chemical engineers on Wednesday approved the formation of an Institution of Chemical Engineers, and appointed a provisional committee (p.595).

Our Market Report records a steady, though quiet, demand for chemicals generally, and a better export demand, with a brisk inquiry for certain lines (p. 605).

Books Received

PRACTICAL CHEMISTRY OF COAL. By A. F. Findley and R. Wiggington. London: Benn Brothers, Ltd. Pp. 140. 12s. 6d.

MODERN GASWORKS PRACTICE. By Alwyne Meade. Second Edition. London. Benn Brothers, Ltd. Pp. 815. 55s. net.

THE INSTITUTE OF CHEMISTRY. Register of Fellows, Associates and Students. Pp. 191.

The Calendar

Nov.		
14	Chemical Industry Club: "Remarks on a Recent Trade Visit to Germany." E. H. Scholl. 8 p.m.	2, Whitehall Court, London.
14	Lecture on "Modern Applications of Chemistry to Crop Production." Dr. E. J. Russell. 8 p.m.	King's College, London.
14	Society of Chemical Industry (Glasgow Section): "Iron Portland Cement." E. H. Lewis. 7.15 p.m.	39, Elmbank Crescent, Glasgow.
15	Hull Chemical and Engineering Society: "Oil Recovery." R. A. Bellwood, W. Thevenaz. 7.30 p.m.	Wilberforce Café, Waterworks Street, Hull.
15	Society of Chemical Industry (Edinburgh and East of Scotland Section): "Phyto-synthesis." W. O. Kermack. 7.30 p.m.	36, York Place, Edinburgh.
17	Chemical Society: Ordinary, meeting. 8 p.m.	Burlington House, Piccadilly, London.
17	Society of Dyers and Colourists (West Riding Section): Paper by Professor E. C. C. Baly.	Leeds.
18	Chemical Industry Club: Third Annual Dinner. 7.30 p.m.	Connaught Rooms, London.
18	Society of Dyers and Colourists (Manchester Section): Papers by Dr. A. Everest and Mr. A. J. Hall.	Manchester.

Notes on the Colloidal State and Colloidal Terminology

By A. A. Pollitt, M.Sc.

The writer outlines the history of colloidal chemistry and draws attention to the gradual developments which have led to present-day conceptions of the subject. The somewhat involved terminology is fully explained, while consideration is given to factors such as those which influence the permanence, etc., of colloidal solutions

ALTHOUGH colloidal gold, in the form of Purple of Cassius, was known as far back as 1690, it was not until the work of Graham on liquid diffusion in 1861 that the systematic study of the colloidal state began. From the results of his experiments on the rates of diffusion of different compounds, both organic and inorganic, he compared the property of liquid diffusion with that of volatility, remarking that the range of the diffusive mobility shown by different compounds appears to be as wide as the range of vapour tensions. Soluble mineral sulphates, alcohol, sugar, and potash, etc., differ considerably in their rates of diffusion, but they all belong to the so-called "volatile" class. The comparatively "fixed" class is represented by substances characterised by their extremely slow diffusion and by their non-crystalline nature, for example, silicic acid, starch, dextrin, gum, and gelatine. The word "colloid" was, in fact, suggested by the last named of these, which is so typical of the class, and which is derived from the Greek "κόλλα," meaning glue.

It was fully understood at this time that no sharply-defined distinction could be drawn between colloids and crystalloids, but such classification appeared to be justified by the great differences in properties existing between the more extreme members of the two classes.

General Characteristics of Colloids

In spite of the increasing attention which the subject of colloidal chemistry has received, particularly during the last twenty-five years, the general conception of colloidal properties has suffered but little modification. The investigations of Graham and others showed that crystalloids can diffuse through membranes of colloidal substances with velocities approaching those at which they diffuse through pure water, whilst colloids are almost or completely unable to pass. This was at once seized upon as constituting an important and fundamental distinction between the two classes, and Graham notes that: "Of all the properties of liquid colloids, their slow rate of diffusion in water and their inability to pass or penetrate a colloidal septa, are the most useful in distinguishing them from crystalloids."

Colloids are often soluble in water and appear to have a pectous or curdled modification into which the slightest influence frequently causes them to pass. They are notably inert in chemical reactions, and their reacting weights are always high. Thus an organic acid may have a simple formula and a low molecular weight, but in the colloidal form the reacting weight, as indicated by the small quantity of alkali necessary for neutralisation, must be infinitely greater.

In view of the more recent researches it is clear that we cannot rigidly regard one substance as a colloid and another as a crystalloid; a large number of bodies which Graham would have considered as typically crystalloidal have been obtained in the colloidal form. Weimarn has shown that gelatinous precipitates are frequently obtained when a compound separates rapidly from a solution in which it is sparingly soluble, and it is well known that the character of precipitates depends upon many factors, such as temperature, viscosity of the medium, rate of formation, and the solubility of the solid phase, etc. He has demonstrated that by adding an alkaline earth metal or an alkali thiocyanate in a mixture of amyl alcohol and ether to an acid dissolved in the same solvent, the gelatinous modifications of the chlorides, sulphates, and nitrates of sodium, potassium, calcium and barium, etc., may be obtained. It is clear then that the existence of a substance in a gelatinous condition does not always justify the assigning of a high molecular weight to the body as was originally supposed. Fischer found, for instance, that, although glycylvaline anhydride showed a pronounced tendency to separate from its solutions in a gelatinous form, its molecular weight, determined cryoscopically, was 156, which value is indicated by the simplest formula.

Indisputable evidence is available of typically colloidal substances appearing in the crystalline form, and of these crystalline egg albumen and serum albumen were noted even by Graham, who regarded them as illustrations of the maxim that in Nature there are no abrupt transitions and no absolute distinctions of class. He clearly recognised the absence of a sharp line of demarcation between colloids and crystalloids, and it would appear, as the result of recent investigations, that the two states may be possible for all matter.

Colloidal Solutions

Colloidal solutions were considered by Graham to be homogeneous, and many subsequent workers upheld this view. Schulze regarded the colloidal solutions of arsenic sulphide as true solutions, and supposed this form and the insoluble form to be allotropic modifications. From experiments made with colloidal silver, with particular reference to its electrical conductivity, optical behaviour, and conditions of precipitation, Barus and Schneider (1891) concluded that the solutions consisted of extremely fine particles of metallic silver, which were retained in suspension by the tenacity of the medium. This opinion resulted in a lively discussion between the supporters of the "solution" theory and the "suspension" theory of colloids, and the question centred largely on the homogeneity of the solutions; that is, whether they should be considered as one-phase or two-phase systems.

Picton and Linder obtained results of great value in this direction from their investigations into the preparation and properties of colloidal solutions of certain metallic sulphides. They obtained a colloidal solution of arsenious sulphide containing as much as 11 or 12 grammes of As_2S_3 per litre, and this solution could be kept for months without precipitation, could be filtered through a porous pot, and was capable of diffusion. It appeared to be perfectly homogeneous when examined microscopically.

A solution of antimony sulphide, similarly prepared, was incapable of filtration or diffusion, and when examined microscopically did not reveal the presence of particles until after standing for several days. Both solutions, however, when examined by the Tyndall method, gave evidence of the existence of particles, and colloidal solutions of mercuric sulphide and ferric hydroxide gave similar evidence. In the case of silicic and molybdic acids evidence of this kind was not indicated.

Picton and Linder prepared other modifications of arsenious sulphide, in addition to the one mentioned above, and found that the differences in their properties depended on the size of the particles. They divided their modifications into four classes:

(1) In which the aggregates were visible microscopically.
(2) In which the particles were invisible, but not diffusible.
(3) In which the particles were diffusible, but not filterable.
(4) In which the particles were diffusible and filterable, but which polarised a beam of light.

In 1893 the ultramicroscope was devised by Siedentopf and Zsigmondy, by means of which ultramicroscopic particles can be rendered visible as points of light and the approximate size of the particles estimated. Examined in this way, nearly all colloidal solutions show the presence of submicroscopic particles, and it has been established that no sharp line can be drawn between true solutions, colloidal solutions, and colloidal suspensions. Colloidal solutions of gold can be obtained in which the size of the particles vary within very wide limits, on the one extreme forming microscopically visible suspensions, and at the other extreme being so small as to be beyond the limits of visibility by the ultramicroscope, and behaving like a true solution.

Although in certain typically colloidal solutions no ultramicroscopic particles can be observed, their absence is not thereby proved, since the method of their detection depends on the existence of a sufficient difference in the refraction and dispersion coefficients of the particles and the medium, and the more nearly these factors approach in the two phases the larger must be the particles if they are to be revealed by the ultramicroscope. It would appear, therefore, that in the absence of a rigid definition of the term homogeneity, the discussion as to the homogeneity or heterogeneity of colloidal solutions is futile. At the moment the prevailing opinion is to consider such solutions as two-phase systems, and that the properties peculiar to them are mainly due to their enormous specific surface (*i.e.*, the quotient of surface by volume). These properties are connected to a large extent with surface phenomena, such as surface tension, adsorption, and electric charges, etc., and it may be, in consequence, anticipated that "colloidality" will be more pronounced the smaller the size of the particles.

Classification of Colloids

Ostwald's terminology will be found very convenient in dealing with colloidal systems, and may be briefly outlined as follows: If in a two-phase system one phase is continuous and coherent and the second phase is distributed throughout the first in the form of fine particles, the first phase is called the dispersion medium and the second phase the disperse phase. When the dispersion medium is a liquid and the disperse phase a solid, the system is called a *suspension*. If the disperse phase is liquid, the system is an *emulsion* or milk, and should the disperse phase be gaseous, then the system is termed a *foam*.

If the dispersion medium is a gas and the disperse phase a liquid or a solid, the resulting systems are called a *mist* and a *dust* respectively. Similarly, we may have gases, liquids, or solids dispersed in solids, and so on.

The various systems referred to are called dispersoids, and these may be roughly classified in the following manner, according to their degree of dispersity:

(1) True or coarse suspensions and emulsions, size of particles greater than 0.1μ, specific surface less than 5×10^4.
(2) Colloidal solutions, size of particles between 0.1μ and $1\mu\mu$, specific surface between 5×10^4 and 5×10^6.
(3) Molecular or ion dispersoids, particle size $1\mu\mu$ or less, specific surface greater than 5×10^6.

This classification is, of course, purely arbitrary; the degree of dispersity in the same system is a changing quantity, and systems may exist in which the size of the particles of the disperse phase varies from that of the coarse suspensions to the dimensions classed above as molecular.

Other methods of classification have been suggested. In one of these distinction is made between colloidal solutions and colloidal suspensions, the former being viscous, gelatinising systems which are not easily coagulated by electrolytes; and the latter, the easily coagulated, non-viscous and non-gelatinising systems. This classification includes most of the organic colloids in the first class, and the colloidal metals, hydroxides and sulphides in the second class, hence one sometimes finds the terms organic and inorganic colloids. Some authorities consider the distinction between these classes to be dependant on the attraction between the disperse phase and the dispersion medium, and it has been proposed to call the first-class lyophile colloids and the second-class lyophobe colloids. The lyophobe colloids are obviously closely allied to the coarser suspensions in their sensitiveness to coagulation, lower viscosity and easily observed Brownian movements, and that the precipitates resulting from coagulation are solids. There appears to be every reason to regard the lyophobe colloids as being solid-liquid systems—that is, a solid disperse phase in a liquid dispersion medium, in spite of the fact that gold and arsenious sulphide can be obtained in all grades of dispersity. With regard to the lyophile colloids, there is considerable evidence in favour of regarding these as liquid-liquid systems, and their properties may be explained to a considerable extent by considering them as mixtures of two partially miscible liquids in the region of the critical solution temperature Viewed in this way, solutions of lyophobe colloids bear a similar relation to true suspensions as do the lyophile colloids to true emulsions, and for this reason reference is frequently made to the two classes as suspensoids and emulsoids.

Coagulation

Colloidal solutions should always be regarded as unstable since they all tend to solidify, gelatinise, or precipitate in the course of time. Such changes can be accelerated artificially by various influences, such as change in concentration, change in temperature, the addition of electrolytes or non-electrolytes and mechanical agitation. Colloidal solutions may be compared to super-cooled or supersaturated solutions into which the introduction of a foreign substance accelerates a change already in progress.

Under these various influences colloids may separate from their solutions in different forms; as a powder, as a flocculent or gelatinous precipitate, etc., or the whole system may form a jelly, and various names have been given to these different phenomena. It is not possible, however, to define these terms accurately nor to restrict any one to a particular case. As instances of these terms the following may be quoted: Coagulation, flocculation, sedimentation, precipitation, setting, and gelatinisation.

The precipitated or isolated colloids may frequently be brought again into solution, if the conditions of precipitation are reversed. Thus if a colloid is isolated by means of an electrolyte, it may in many cases be restored to its original condition if the electrolyte is removed by dialysis. In many cases it is found, however, that once a colloid is separated from a system it can only be restored to that system by repeating the whole process whereby the system was originally obtained. In view of these differences it has been suggested that colloids be classed either as reversible or irreversible, and in this method of classification the term "coagulation" is restricted to the separation of an irreversible colloid, and the solidification of gelatine, etc., is termed "setting." This classification is not without serious objections, since, for instance, a particular colloid may be either reversible or irreversible according to the nature of the influence whereby it is precipitated, or a physical influence applied in a particular way may lead to reversible precipitation, whilst if applied in some other way may lead to irreversible precipitation. It has, however, been suggested that the capability of reversion should be considered with reference to one influence only, namely, dessication at the ordinary temperature. In this way most albumens, gums, and desetrin, etc., are reversible, whilst most of the inorganic colloids are irreversible. Even then the classification is not wholly satisfactory, and many authorities entirely disregard it, preferring to consider all colloids as unstable and therefore irreversible. Given sufficient time, it is believed that all colloids would assume the crystalline condition, this being, in fact, considered a statical condition of matter whilst the colloidal condition is dynamical.

The coagulation of colloids by means of electrolytes may be divided into two groups :

(1) Solutions of many of the organic lyophile or emulsoid colloids, when pure, are uninfluenced by the addition of small traces of metallic salts, but are precipitated by concentrated solutions of suitable neutral salts when these are added in sufficient excess. The rate and completeness of precipitation will depend on the nature of the emulsoid and of the salt and on the concentration of the latter, the completion of precipitation requiring a higher salt concentration than the initiation of precipitation.

(2) Most inorganic colloids are precipitated by comparatively small quantities of electrolyte, and usually the process is irreversible. Coarse suspensions of clay in water behave in this manner, and the quantity of electrolyte, though small, has, however, a minimum value, and this may vary with the nature of the electrolyte and of the colloid.

It has been shown that for each salt there is a certain dilution beyond which it ceases to cause precipitation or coagulation, and also that the precipitating powers of salts depend mainly on the nature of the metal and but slightly on the acid radicle. Further, it has been found that the precipitating power increases with the valency of the metal, being least for salts of monovalent metals and greatest for salts of ferric iron, chromium and aluminium, etc. Considering valencies of one, two and three, the coagulating power increases in the order of 1. n. n^2, the value of " n " appearing to be in the neighbourhood of 30.

The process of coagulation seems to occur in two stages : the smaller particles first group themselves into larger aggregates, and these then settle by gravitation. At the surface of separation of the disperse phase and dispersion medium surface tension begins to operate, and, other influences excluded, the tendency will be for the surface to become smaller, and further aggregation of particles will result. Should the particles carry electric charges, then a reduction in surface will increase the available electrical energy, and in this case there would be a tendency towards increased surface, and this, counteracting surface tension, would retard coagulation. It is clear that the removal or neutralisation of these charges will induce coagulation, and it has been shown that in a colloid system in which the particles are negatively charged, the addition of an acid will decrease their negativity, and a point may be reached where the particles and the fluid in which they exist become isoelectric. As this point is approached the particles increase in size, and the stability of the system decreases, and finally coagulation occurs.

Gels and Sols

The term " gel " is generally used in reference to the precipitated or coagulated colloid, no matter whether it is jelly-like or not, so that even the solid from a coarse suspension is spoken of as a gel. " Gelatinisation " is now restricted to describe the phenomenon of setting to a jelly, as occurs with many of the emulsoid class of colloidal solutions. It is usually induced by lowering the temperature, the resulting jelly redissolving when the temperature is raised. The opposite effect has been observed in the case of casein ; the addition of calcium salts to a slightly alkaline solution of casein produces a mixture which gelatinises on warming and liquefies on cooling.

Graham regarded gels as chemical compounds ; the gel of silicic acid in water, or hydrogel, was considered as a hydrate, and if the water were replaced by alcohol, an alcogel was supposed to exist. This view has since been disproved, and its complete rejection seems to be justified.

" Sol " was the name originally used by Graham for colloidal solutions in general. Later, in order to indicate the type of dispersion medium, distinctions were made, and such terms as hydrosol, alcosol, and organosol appeared.

Stability of Colloids

Amongst the so-called stabilising factors which influence the permanency of colloidal solutions, the following may be noted :

(1) The coincidence between the minimum stability and the isoelectric point previously mentioned.

(2) The degree of dispersity of the disperse phase, or, the greater the specific surface the greater the stability.

(3) The viscosity of the medium. The addition of a viscous fluid to an aqueous colloid solution often increases the stability, and insoluble substances may be obtained in colloidal solution by dissolving them in, say, a strong solution of cane sugar.

(4) The dielectric constant of the medium influences the stability, thus the more strongly ionised media yield the most stable colloidal solutions.

(5) The stability of certain metal sols is determined by the relation between the electrochemical character of the disperse phase and the chemical composition of the dispersion medium. Thus the more electronegative metals—platinum, silver, and gold—can be obtained as sols in water or in ethyl malonate (the particles being negatively charged), but not in alcohol, whereas lead, zinc and tin give sols in alcohol (the particles being positively charged) but not in ethyl malonate. It has been suggested that for the formation of sols of the more electronegative, the dispersion medium must contain an ionisable hydrogen atom, and for the more electropositive metals an ionisable hydroxyl vadicle must be present.

(6) In some cases the presence of an electrolyte may have a stabilising effect instead of the usual coagulating influence, and the term " stabilising ions " is used to illustrate such cases.

(7) In most suspensoid colloids, which are easily coagulated, the stability may be greatly increased if a colloid of the emulsoid type is present. The stability of the system so produced may be equal even to that of the emulsoid itself, and the amount of the emulsoid required is often extremely small in proportion to the quantity of suspensoid stabilised. Emulsoids used in this way are called " Protective colloids."

(8) " Peptisation " is the term applied to the process of bringing otherwise insoluble substances into colloidal solution, and was suggested by the analogy existing between the process and the digestive action of pepstone on albumen. As an example it may be stated that one part of caustic soda in 10,000 parts of water at 100 C. will bring into solution 200 parts of silicic acid. Similar effects are produced not only by electrolytes, but also by colloids themselves, and it is now customary to speak of peptisation by ions and peptisation by colloids.

" Singer & à Brassard "

Mr. Fred à Brassard, of 46, Vicar Lane, Bradford, in a circular to the trade, announces his decision to retire from business as from November 1, and returns thanks for the support received during more than forty years of his business career. His aniline colour and chemical business is being transferred to his " old and valued friend," Mr. Adolf Singer, with whom he has been associated so long, and to his son, Mr. Herbert à Brassard, who has been in the business for many years. The new firm will be known as " Singer & à Brassard." All liabilities up to October 31 will be paid by Mr. Fred à Brassard, and all accounts due to that date should be made payable to him.

In announcing that they are taking over the business, with the whole of the staff, the new firm state that the chemical department will continue under the management of Mr. Wilfred Goldsbrough, who has been connected with Mr. à Brassard for more than twenty years.

Germany Seven Years After

By C. H. Hughland

II.

THERE are little boys without shirts, stockings, and boots in the streets of Cologne. Have they really no clothes or are they dressed to play the part? In a town farther East I saw, drawn by a very sorry specimen of horseflesh, a Government post-van, old, creaking, badly sprung, without any paint or colour whatever, except the deep red of the rust coating its iron fittings. Is that poverty—penny-wise, pound-foolish economy—or just eyewash, an example of the art of playing to the gallery?

The Downfall of the Mark

The mark at 1,200 to the pound sterling! Is that really the world's estimate of the credit of a country peopled with many millions of industrious, scientific folk, or is it an artificial position created by printing presses set in motion by men determined that they will not pay the reparations demanded by the Allies?

At the beginning of October, when 450 marks could be paid for one pound, I discussed the position with an astute Frenchman who carries on a big business in many countries. He said that Germany would not go bankrupt, but that if she could possibly avoid it she would not pay. In his view the mark would fall to a thousand or even 1,500 to the pound (this part of his prediction has been fulfilled). Germany would then point to the impossibility of finding the next instalment of reparations due, and some portion of it would be remitted by the Allies. From time to time this manœuvre would be repeated in the endeavour to whittle down the total amount of the indemnity.

Business men in Germany would hardly be likely to admit that there is any truth in these allegations of chicanery in the manipulation of the currency. Industrial magnates, speaking as individuals, all expressed themselves in much the same way, saying, "We have lost the war, we realise that we must pay up, but how are we to do it if the Allies take the most productive coal-and iron-bearing districts and leave us largely without the means of manufacturing and making money?"

German View of Reparations

The unemployment problem in England and America occupied a large amount of attention in German newspapers, and it was freely said that this unemployment was largely due to the fact that Germany could flood the world with cheap goods owing to the state of the exchange. Time after time in conversations with men of business the impossible character of the demands of the Allies was emphasised. One man controlling an enterprise employing nearly ten thousand men said to me, "We thought Napoleon was bad enough, but these reparations surpass anything he did or would have done in the circumstances." I then asked him what, in his view, would have happened if the tables had been turned and Germany had won the war. His reply was so characteristic that I give it word for word for what it is worth. "Germany," he said, "would at least have so arranged matters that she *got the money*. If the Allies persist in their present policy it will be impossible for them to get it." The mark fluctuated between 450 and 740 to the pound during my stay in Germany. When it reached 650 and 700 to the pound it was said on all hands that the whole world did not contain sufficient money to pay the indemnities at such a rate of exchange.

France is convinced that Germany can pay but won't. My own view is that Germany will pay if she can. She is a trading nation, and was in pre-war days, at any rate, accustomed to meet her obligations. She is anxious, if only to reinstate herself somewhat in the world's estimation, to meet her obligations now. She is logical enough to realise that the loser pays, but she does not intend to pay without a good deal of wriggling. Therefore, while the fall of the mark may or may not be due to external causes, it is at least certain that big business and high finance will do little to arrest the fall except under pressure.

Restricted Import of Raw Materials

The downfall of the mark means that at present Germany can undersell the world, more especially in those commodities the raw materials of which she produces herself. That is the way in which the unprecedented state of the exchanges affects manufacturers and merchants in Great Britain America, and Japan, but this landslide in the currency plays some queer tricks inside Germany itself. Her people find that it is a good deal easier to sell than to buy. Therefore, if you have a taste for Havana cigars you will be wise to take them with you. Your search for them will be extended, and the price you will be called upon to pay for them will give you food for reflection as to what happens in a country whose credit has gone to pieces. You have probably promised your children and female relatives that you will bring them some marzipan, as you used to when you went to Hambourg, Baden-Baden, or Munich in the old days, but you will disappoint them, for marzipan is conspicuous by its absence in Germany owing to the fact that almonds have to be imported and that at the present time they are not being imported.

If you dine at the very best hotels you will find the tables covered with linen cloths, but in high-class and middle-class restaurants they are covered with white paper. You will notice many Germans of good position wearing clothes of a curious texture, rather difficult to describe, but looking something like a mixture of camelhair and blotting paper; and, wondering why that should be, you will remember that Germany produces very little wool, and in former days was one of Yorkshire's best markets for woollen cloths. Talk to publishers in Liepzig and you will find that the production of a cloth-covered book is a matter of great expense, as the binding cloth is made of imported materials. The cafés and better-class restaurants make a song of the fact that their coffee is made of genuine coffee beans, and you reflect once more that coffee beans, if they are ground in Germany, have to come overseas and be paid for in foreign currency bought at an exorbitant rate.

Day by day Germany has to search inside her own borders for materials to work up into manufactured products. She is, with her scientific mind, thinking more especially of articles containing the minimum of material and the maximum of work to make that material valuable. An instance of this was a new slide rule which I saw being made by the largest engineering concern on the Rhine. It consisted solely of a strip of steel, but the precision work put upon it made it an article of considerable value.

Fantastic Figures

The depreciation of the mark strikes the traveller who knew Germany in the old days as being really comical. A young foreigner at a German technical school twenty years ago could live quite comfortably on 50 marks a week. To-day the tourist gives 50 or (with the still further depreciation which has since taken place) perhaps 100 marks as a tip to the hall-porter when he leaves a German hotel. One pays 15 or 20 marks for the coffee and rolls and butter which the waiter brings to the bedroom in the morning. A square meal in a good restaurant works out at anything between 150 and 250 marks, a sum which at the 1913 value equals about £12 10s., but at its present exchange value against English notes 5s. or 6s. The meter on your taxicab may state that you owe the cabman 8 marks, but a printed explanatory notice tells you that you must multiply this sum by ten to arrive at the correct fare. The comic papers publish special issues dealing with the mania for speculation, and the worthlessness of the paper. One speculator says to another, "I am papering my room with Austrian kroner notes," and the other replies to him, "I am papering mine with German marks, but am using Austrian kroners as a lining paper."

The conclusion that one inevitably draws is that the present state of affairs is as unprecedented as was that when credit came to a standstill soon after the declaration of war, when special measures were taken to relieve the situation. The Allies must make up their minds quickly as to whether Germany is simply playing a colossal game of bluff, and, if so, what steps they must take to put a stop to that game.

Chorley Rubber Company

The workers of the Chorley Rubber Company have struck against the employers' PROPOSAL TO EXTEND THE WORKING HOURS from forty-seven to fifty-two and a-half per week at the same rate of pay. The workers of the Leyland and Birmingham Rubber Co. have also resolved not to work the longer hours.

Reviews

THE CHEMISTRY OF COLLOIDS. By W. W. Taylor, M.A., D.Sc. (Second Edition.) London: Edward Arnold & Co. 1921. Pp. 332, 10s. 6d.

The work under review is the second edition of Dr. Taylor's deservedly well-known text-book, which first saw the light in 1915. The main features of the book remain unaltered, although a considerable amount of new material has been added. As the author informs us in his preface, "this has only been done . . . where either the new matter was a more convincing illustration of an already established theory, or the new experimental results had led to changes in the previously accepted theory." Part I. (The General Properties of Colloids) deals with suspensoids and emulsoids, diffusion and dialysis, osmotic pressure and molar weight, optical properties, Brownian movement, the size of particles and ultrafiltration, electrical properties, precipitation, protection and mutual precipitation, and the properties of gels. Part II. (Methods of Preparation) describes crystallisation, solution, and electrical dispersion methods. Part III. is devoted to Adsorption phenomena, and Part IV. sets forth some applications of colloid chemistry—*e.g.*, in the dyeing and tanning industries and in relation to the soil, sewage disposal, and biology. The matter throughout is well chosen and lucidly described; the style is unusually bright and the general handling of an undoubtedly difficult and involved subject is quite admirable. Here and there, naturally, opinions are expressed regarding which differences may arise; for instance, in connexion with the question of nomenclature, Mr. Taylor takes the view that the terms "Pectisation" and "Peptisation" have not been generally adopted. If this is so, more's the pity, for, so far as suspensoids are concerned it is difficult to imagine more expressive words. Mr. Taylor's work may be most cordially recommended to students and others who are not already acquainted with it.

P. S.

ATOMIC THEORIES. By F. H. Loring. London: Methuen & Co. Pp. 218, 12s. 6d.

This book deals with a great number of the problems connected with the properties and complexities of the Atom. It gives an account of Rutherford's Nuclear Theory of the Atom, of Electrons, Langmuir's Development of the Octet Theory, and all the work which Sir J. J. Thomson and others have done on the structure and electric properties of the Atom. There is a brief outline of some of the recent radio-active research with special reference to Soddy's investigation of isotopes and Aston's mass spectra. The relationship existing between spectra of all kinds and the position and number of electrons and atomic nuclei is fully discussed, and the most recent information on all these and some other topics is set out in a handy and well-printed volume, with useful diagrams and indices.

The author has collected a mass of valuable information, which is scattered about in many physical and chemical journals, and has rendered a considerable service to all students of theoretical chemistry. But his book is, like its subject, difficult. He has a fondness for sentences which require a considerable effort to understand. Thus, in dealing with the different varieties of lead, he states that ordinary lead "seems to have been evolved independently of radio-active change as if it were a product of *evolution*, whereas the radio-leads (those of radio-active origin) are the product or result of *devolution*." Again, he states, "The mechanics of ionisation and radiation are not fully known, but the latter phenomenon is believed to be a wave action that travels as an undulation (as a ripple on a pond)—as distinct from a forward compression—and—rarefaction wave (sound)—through space at a fixed speed of about 300,000,000 metres per second."

In these two examples the similes do not help the average man to understand more clearly; they rather complicate the problem. The author dearly loves parentheses, and this gives his style a rather jerky character; for instance, "Moreover, in the case of other radio-active changes, when B-rays (high-speed electrons: some move with a velocity over nine-tenths that of light, light velocity being 186,000 miles per second) are ejected from the atom, a transformation of the chemical and physical character of the substance (element) also takes place." Such sentences fatigue the reader; they compel his mind to execute a sort of Brownian movement, and a little trouble on the part of the author would have saved much to his readers. But he may be consoled by the thought that some of the authors whom he quotes—though not all—are equally inconsiderate.

When we compare our present ideas concerning elements and atoms with those which prevailed a generation ago, we realise the immense progress that has been made; the discovery of the inert gases in 1894 and 1895, the discovery of X-rays also in 1895, followed at a short interval by the discovery of radium and the other radio-active elements have opened up new ideas. During the last fifteen years Thomson, Rutherford, and Soddy have put forward theories which are supported by experiments, and Aston has quite recently solved the problem of those atomic weights which are not integers. The history and meaning of these researches up to date has yet to be written in a popular style; meanwhile the present volume is a valuable storehouse of information.

M.

AN INTRODUCTION TO BIOPHYSICS. By David Burns. London: J. and A. Churchill. 1921. Pp. 426, 21s.

If, as Pope maintained, "the proper study of mankind is man," then chemists and physicists, and more especially the latter, can but plead guilty of having grievously neglected their most obvious duty. Of chemists it can at least be said that at long last they have seen the error of their ways, but physicists!—hardly have they yet repented. On their behalf it can, however, be pleaded that they have sown the seed, and it remains for the physiologist and chemist to reap the harvest.

To explain physiological facts on the basis of physical theories is no easy matter. The training of the physiologist is, in general, lacking on the mathematical and physical sides. There are glorious exceptions to this general statement, and it is to these mathematical-physical-physiologists that we look for the unravelling of the skein of processes, their causes and modes of operation, constituting the activity of the living organism in all its aspects. Shall we look in vain?

The present volume, so far as the reviewer is aware, is the first to attempt to give a reasonably complete and concise account of the processes of the vertebrate living organism, on a physical basis. Thermo-dynamics, colloidal theory, optics, radio-activity, elasticity, electrical theory, &c., are all pressed into the service. The result, we must confess, is not convincing. Perhaps that is inevitable; it certainly casts no reflection upon the present volume. We heartily commend it to chemists, physicists, and physiologists who would know the points of contact between their several subjects. Such adverse criticisms as we presume ourselves qualified to make must be on the physical side. They refer to relatively minor points. It is quite wrong to designate (p. 168) as "strain," "the force which is applied to a body." It may be so "termed by engineers," but the author should put the engineers right on this matter. Nor is it right to state, as on the same page, "this" (Hooke's Law) "as a formula is known as Young's Modulus." We feel sure that, on consideration the author will agree that the statement on p. 103 in reference to the Nicol prism, that "the index of refraction of balsam is intermediate between the minimum values for the ordinary ray and the extraordinary ray," though customary in text-books is perfectly meaningless. Other minor points tending to mar an otherwise excellent production include the omission to indicate the

significance of the ordinates in Fig. 41, the classification of salts on p. 44 into electrolytes and non-electrolytes, and the statement on the same page that pure distilled water is a non-electrolyte. When a second edition of the work is being prepared, and this must surely soon be called for, attention should be given to the necessity for providing references to the work of the various authorities quoted. The rather misleading index of authors, having no reference to the text, at the end of the volume should, at the same time, be removed.

J. S. G. T.

Britain and Canada

A Canadian's Plea for Better Trade Relations

To the Editor of THE CHEMICAL AGE.

SIR,—Several months ago I wrote a short letter to THE CHEMICAL AGE (March 19) in which I pointed out that last year Canada imported $900,000,000 worth of goods from the United States, and I said that a considerable portion of these goods should be obtainable from Britain. Since writing this letter, I have conversed with both Englishmen and Canadians upon the subject, and I trust that you will not consider it inappropriate for me to return to it.

A number of Canadians are somewhat apathetic, but I think there is no doubt that the majority are anxious to deal with the Home Country. Recently I discussed this matter with the manager of an important firm in Montreal dealing in instruments and supplies for architects and engineers and in apparatus for chemical laboratories. He buys pyrex glass in preference to glass of English make, but the greater fraction of his purchasing is done in the United Kingdom. He told me, however, that he was often put to great and unnecessary inconvenience and financial loss owing to the lack of adaptability of the British firms to Canadian conditions. He cited, as an instance, the Canadian Customs Regulations, which require a particular form of invoice, and told me that he had taken special pains to send to a firm with which he was dealing a copy of the invoice form, with all directions and information as to where and how the forms could be got in London. The goods arrived, an invoice came, but not made out on the proper form, and not such as the Customs would accept. He wrote to the English firm once, twice, thrice, before he got the proper invoices, and meantime the goods lay for three months in the Customs warehouse, and he was paying storage. He said that this was not an isolated case, and he was sure that other firms had had a similar experience. Could he be blamed if he ordered goods from an American firm or even a German? He said that the Germans would need to be told only once, and perhaps not at all, because they keep watch on the conditions of the countries with which they deal.

This view was confirmed by another gentleman with whom I discussed the matter, telling him what I had heard. He said he had been unable to buy wool fat except from a German firm. They had had difficulty in filling the order, shipping through Antwerp, but the shipment arrived in Montreal with all papers made out in such a way that it was at once obtainable for his business, and the exact cost of the material was known. I do not know whether the Canadian regulations are reasonable or unreasonable, but there they are, and the British firm was told about them but paid no heed.

In order to illustrate how difficult it is to get orders filled to suit the requirements of the customer, the gentleman whom I mentioned first said that a few years ago he told the firm with whom he was dealing that he wished four-screw transits instead of the three-screw, which is apparently the typical English pattern. He was told that the three-screw were the best, but replied, "That may be so, but Canadian engineers wish the four-screw ones, and they are the only ones I can sell." An agent came out soliciting orders, coming first to Montreal. No orders in Montreal—three-screw transits not wanted. No orders in Toronto—three-screw transits not wanted. No orders in Winnipeg for the same reason. No orders anywhere in Canada. Back again to Montreal. The firm spoken of then said, "We will place an order for two hundred transits if you make them with four screws. Finally, the order was taken; the two hundred transits were sold, more were ordered, and in the first year five hundred were disposed of. I saw some of the transits in the Montreal office, and was told that the firm had several hundred in stock in various parts of Canada at the present time, and that now the English firm was ready to supply any instruments according to specifications. Unfortunately what was learned, with difficulty, by this one English firm has not been learned at all by many others.

One of the English visitors to the recent Annual Meeting of the Society of Chemical Industry told me that he desired a considerable quantity of a pure chemical for research purposes. He set no limit of price; he was willing to pay for it. After trying for over a year to get the material in Britain he applied to a German firm which at first declined the order because they could not get the raw material. But when my informant told them that he would supply the raw material they took the order, and in this case again raw material was sent from Britain to be returned from Germany as a refined product. And it was no question of cheap wages and a depreciated mark.

I found some of the visitors alive to the importance of the question, but others were apparently somewhat indifferent. I was told that the condition of affairs in Canada is natural in view of the proximity of the United States. But does the advantage of neighbourhood enjoyed by the United States counterbalance the advantage of exchange rates and lower duty enjoyed by Britain? Why cannot as good and as cheap microscopes be supplied by Britain as by the United States?

I was told of labour troubles, which we, of course, know about. When I suggested a propaganda of sane economic science to counteract the insane teachings that labour receives from demagogues, one man said the only way was to give the labour people enough rope and they would hang themselves. But while labour hangs itself it hangs the rest of the country. How many hundreds of millions of pounds have been lost to the country by strikes? And *do* we wish labour to hang itself? Do not we wish labour and capital and science to *hold* together instead of hanging either together or separately? I do not believe the case is so hopeless. There are glib-tongued demagogues that carry the crowd; but there must be a number of glib-tongued men who are not demagogues, and why should they not be employed to spread a propaganda of sanity? Why should there not be at every meeting in which workmen are harangued by demagogues some good and clever speaker, ready of wit and quick of tongue, to point out the fallacies? Of course, what has been done by demagogues in years cannot be counteracted in a day, but surely it is unwise to adopt a pessimistic, fatalistic attitude, and to leave the field to iconoclasts and Bolshevists.

I hope that my letter is not too long. To some of your readers what I have written may be but a repetition of an old tale. Others may find it not in accord with their experience. That is probable, otherwise trade between Britain and Canada would be still less. But with labour unemployed in Britain, and with Canada as a possible market for British goods, it behoves everyone to take an interest and to see if *he* cannot do something to *improve* the condition of affairs. It is especially for British business men and Canadian business men to get together and to work together for their mutual benefit.—Yours, etc.,

JOHN WADDELL.

Queen's University, Kingston,
Canada, October 25.

Precautions with Pulverised Fuel

To the Editor of THE CHEMICAL AGE.

SIR,—In the issue of THE CHEMICAL AGE of October 29 an article appeared under the heading "Precautions with Pulverised Fuels." We note that the writer lays particular stress on the care which should be exercised when powdered coal is stored and, we think, rightly so. However, we think we should bring to your notice a system of using powdered coal, under boilers and in connexion with general furnace work, which necessitates no storage of powdered coal, it being burnt as soon as it is pulverised.

In addition to this advantage the machine referred to, which goes by the name of the "Turbo Pulveriser," is so constructed that it will deal with coal which may be termed "commercially" dry, as against the previous recognised limit of 1 per cent. or under of moisture content. It will

be seen that with these two conditions the two operations which the United States authorities have looked into with a view to eliminating risk have been done away with, namely,

(1) The conditions under which powdered coal is stored.
(2) The danger of fires in dryers where a low moisture content has to be arrived at.

It may be of interest to some of your readers to know that a number of these machines are now in successful operation at works in this country, while a very large number of them are in operation on the Continent. This large number may be explained by the fact that the coal is higher in cost and in some instances is very poor in quality; therefore powdered coal firing has become practically a necessity on the Continent in the routine of many industrial concerns. In this country, even with an appreciable reduction in the present cost of coal, to decrease manufacturing costs some such change will also become a necessity.—We remain, &c.,

THE POWDERED FUEL PLANT CO., LTD.
C. E. ATKINSON, Manager.

47, Victoria Street, S.W. 1, November 8.

"The Case of Cream of Tartar"

To the Editor of THE CHEMICAL AGE.

SIR,—We have read your article under the above heading in your issue of October 29, wherein you state you are given to understand that a strong protest is being prepared by a number of the leading importers and distributors of cream of tartar against its inclusion in the List of Articles covered by Part I. of the Safeguarding of Industries Act. We also see that the protest is on the ground that cream of tartar is not a key industry and can hardly be considered a fine chemical, but no reason is given for the statement. By reference to the British Pharmacopœia it will be found that cream of tartar has to pass very severe tests as regards purity, and it has always been regarded in the trade as a fine chemical.

You also say it is only fair "to British manufacturers to state that generally they have not taken advantage of the Act to put up their prices." As a matter of fact, the position is that prices are to-day lower than they were on October 1.

The manufacture of cream of tartar has been carried on in this country for some years, and has now reached considerable proportions, probably equal to the whole consumption of the United Kingdom. We ourselves are very large manufacturers of this article, and have steadily increased our output, but there is evidently a body of merchants and dealers in this country who would much prefer to deal in foreign rather than in home-manufactured goods, and we presume it is from them that the protest is most strong. We cannot see that it is the consumers' interests they have at heart, and they certainly have no regard for British manufacturers' interests.

As regards the assertion that it is possible that an increased export duty will be put on the raw material coming from abroad resulting in the price of the British-made product being increased, this might be the case if the raw material came from one country only, but as it comes from at least six countries the probabilities are that the country which puts into effect such duties will only suffer by loss of its exports.

The statistics adduced appear at first sight to prove their case, viz.:—that the higher the price the lower the consumption. Closer inspection reveals the interesting fact that vital factors have been omitted so that the figures quoted should only prove their case. Official statistics do not support their contention.—Yours, etc.,

For THE PHŒNIX CHEMICAL CO. (1919), LTD.,
E. J. ALDRICK,
Director and General Manager.

Church, Lancashire, November 9.

Diamond Jubilee of "The Electrician"

The Electrician, which is under the same proprietorship as THE CHEMICAL AGE, issues its diamond jubilee number this week, having made its first appearance on November 9, 1861. It will contain congratulatory messages from Mr. T. A. Edison, Sir O. Lodge, Senatore Marconi, Sir Alfred Ewing, Mr. Edward Hopkinson, M.P., Sir Charles Bright, Mr. J. S. Highfield (President of the Institution of Electrical Engineers), and others, and historical and technical accounts of the development of telegraphic and other electrical application during the past sixty years.

Electrical Precipitation

Dr. H. J. Bush on Recent Developments

THE second meeting of the Manchester Section of the Society of Chemical Industry was held at the Textile Institute, Manchester, on Friday, November 4. In the absence of the Chairman, Dr. Ardern, who was in America, the Vice-Chairman, Mr. John Allan, presided. The Section had invited the members of the Chemical Engineering Group to be present, and to this invitation there was a very cordial response on the part of the Group, the Chairman (Mr. Reavell), the Vice-Chairman (Mr. Garland), and the Hon. Secretary (Mr. Talbot), among others, attending. There were about 150 members of both sections present in all.

In a paper on "Electrical Precipitation," Dr. Bush said that the first systematic investigation of the influence of electric fields on the removal of suspended particles from gases or vapours was made in the years 1884-1886 by Sir Oliver Lodge, although isolated observations of the precipitating effect of an electrified insulated wire surrounded by gas containing suspended particles had been made independently, so long previously as 1824, by Hohlfeld in Leipzig, and about 1850 by Guitard in London. Lodge had in view the use of electrical discharges for the dissipation of atmospheric fog and smoke, although in 1885, in collaboration with A. O. Walker and W. M. Hutchins, he applied his methods to the precipitation of lead fumes at the Dee Bank Lead Works, in Wales. The work was not a success, solely because of deficiency in the electrical equipment available, and was abandoned, although patents covering the processes employed were taken out. During the same period very similar German patents were taken out by Dr. Karl Moeller, but his work had no commercial application.

Until 1906, practically no serious study of the matter was attempted until Dr. F. G. Cottrell had occasion to repeat Lodge's work, and applied his methods to the removal of acid mists in the contact sulphuric acid process. The results were very encouraging, and systematic investigation of the commercial possibilities of this precipitation method was made at the Pinole (California) works of the Du Pont Co. in 1906, after which the first commercial plant of any size was installed at the works of the Selby Smelting and Lead Co. to deal with the acid fumes arising from parting kettles. Subsequently, various organisations were formed in the U.S.A. for working the patents taken out, whilst in England the Lodge Fume Co. had progressed along very similar lines.

Preliminary Considerations

Turning to the fundamental principles of the various processes and plant employed, it was to be observed, said Dr. Bush, that air itself, under normal conditions, had only the feeblest amount of "residual conductivity," the origin of which was still the subject of much speculation and research. Ordinarily, it might be regarded as an excellent insulator, although various well-known agencies, among which was electrical discharge, conferred upon it, by ionisation, the power of becoming a conductor. A familiar instance was the conductivity induced in atmospheric air by the charged cloud, and, as a consequence, there was brought about electrical precipitation of suspended dust and moisture on an immense scale.

Mechanism of Conduction

The chief point to be noted with respect to the phenomena of conduction through air was that Ohm's law was not followed, and that after a certain potential difference had been established between the electrodes no increase in the current passing could be effected by raising the voltage. A state of saturation was reached, which was completely explained by the fact of the conduction being due to ions, the number of these present at any time in an air-gap between electrodes alone limiting the conductivity of the air-gap. Above a certain point ionisation was produced by the potential difference, and the gas became as good a conductor as a good electrolyte—*e.g.*, dilute sulphuric acid. This state of the gas was perfectly stable, being in no wise comparable with the conditions of discharge from a Leyden jar, and it was the ions that were instrumental in causing precipitation of liquids and solids suspended in the air.

Electrical Precipitation Plant

Briefly, the plant necessary for electrical precipitation consisted of two sets of electrodes, one connected to a source

of H.T. potential and another to earth, the air-gap between the two comprising the working space of the precipitating agencies. The shape of the electrodes varied with the conditions of application. Thus one might have earthed plates between which were charged wires, or pipes with charged axial wires, the gas to be treated passing between the electrodes in both cases. Diverse influences acted upon the suspended particles, but all except a small percentage were deposited upon the earthed electrode only.

In some cases difficulties had arisen from high initial ionisation of gases, resulting especially from metallurgical operations, but many of these troubles could be overcome by a proper design of electrodes, and by ensuring that the earthed electrode and its deposits were all maintained at zero potential. If the latter point was not carefully attended to most peculiar electrical effects were produced, which could be illustrated experimentally. These phenomena were best studied from the empirical side, as theoretical investigations could not, in the nature of things, take into account all the diverse conditions governing any particular problem.

Examples of Installations

A number of screen illustrations of existing installations were then exhibited by Dr. Bush. These included views of the plant at Queen's Ferry, following the Gaillard Towers; Admiralty plant at Holton Heath, after the Kessler concentrators, the method of adaptation of existing scrubbers to electrical precipitation work being noteworthy; a pipe and wire installation for recovery of precious metal dust; and the plant installed by the Lodge Fume Co. for the Skinningrove Iron Co. for cleaning blast-furnace gas. Dr. Bush pointed out that the gas had usually about 5 gms. suspended matter per cubic metre, although this figure varied considerably. It was of distinct technical and commercial advantage to remove this dust before using the gas, and 90 per cent. was easily removed by a very simple electrical installation. Slides were also shown of plant for cleaning gases from mechanical pyrites furnaces in the U.S.A. The furnaces burned about 70 tons of pyrites per 24 hours. The plant worked with rather more than 98 per cent. efficiency, recovering about 6 tons of dust per week. Similar installations were employed with the greatest success in Germany during the war, and an electrical precipitator was now regarded as a standard adjunct to a mechanical furnace installation.

In Japan there were over eight installations at work. In the plant at the copper works of the Fuinkawa Mining Co. 6-10 tons of dust, containing 1 per cent. copper and 30 per cent. arsenic, were recovered per 24 hours. The fumes treated arose from roasters, blast furnaces and converters.

Discussion

Mr. JOHN ALLAN, said they were now coming into the region of electrical work introduced into what one would almost term pure technical chemistry. Dr. Bush had not given any figures as to the cost of the installations mentioned. He understood that the separation of arsenical fumes from gases was dependent upon temperature conditions, and that the ordinary pyrites roaster gases were too hot to allow of the separation of arsenic, although the pyritic dust, in the sense of iron oxide and the like, could be removed. It appeared, therefore, rather peculiar that Dr. Bush should suggest that brimstone acid might be made from pyrites, as what they were taught to consider, in the main, was the essential difference between the brimstone acid and the pyrites was the arsenic content of the acid.

Mr. REAVELL asked whether the electrical precipitation process could be applied to the recovery of the powder of dried milk, and, if so, whether there would be any likelihood of trouble through ozone contaminating the milk by causing it to have a nauseous flavour. Also, was there any possibility of explosion occurring.

Dr. WEIL mentioned the American process for making zinc oxide in which a considerable amount of dust was blown over from the furnaces. This dust was heavy and large in size and was usually precipitated in the zinc chamber.

Mr. DRUMMOND PATON pointed out that in the case of the German plants they had isolated the entire structure from the earth. In all static conditions the supply of current must be from the earth. He thought if they analysed the deposit that arose on different poles they would find a different selective action.

Mr. WILLIAM THOMSON referred to the experiment made by Christopher Bell, of turning a stream of water on to the top of a drum. As the water broke on the drum a slight hissing noise was produced. If a rubbed piece of sealing wax was placed over the stream of water the latter immediately began to fall in big drops, and with a patter, as though it were rain.

Mr. HOLGATE mentioned that his problem was that of dealing with gases from a blast furnace containing a specially high percentage content of dust, 10 to 18 grammes per cubic metre, the gases being also emitted at a temperature of from 750 to 1,100°F. He had made enquiries, both in this country and America, with a view to ascertaining the best method of dealing with this dust and the cost of the erection of the necessary installation. At present he was quite undecided what to do.

Mr. MALPAS enquired where the apparatus mentioned by Dr. Bush could be obtained. Two years ago he had gone into the question of the cost of installing a relatively small plant, and found it could not be done for less than £70,000. The expense, of course, precluded the possibility of seriously taking up the idea for the moment.

Dr. BUSH, in replying to the discussion, said it was practically impossible to give any satisfactory information off-hand with respect to cost, as everything depended upon the particular circumstances of the case. It was difficult to standardise the plant. With regard to the question of brimstone acid, he had been thinking chiefly of the appearance of the acid and the complete absence of flue dust. You could not catch the arsenic from pyrites roaster acids. There were installations in U.S.A. for drying lemons and also skimmed milk. Explosion could be prevented. The question of the proportion of dust in gases had an influence upon the efficiency. He presumed Mr. Holgate was referring to ferro-manganese gases, and there was no reason why they should not be treated very successfully. He was of the opinion that the Kling-Weidlin steel mattress filter would not prove to be a serious competitor to electrical precipitation. There were certain advantages in using the smaller tubes in vogue in the U.S.A. when operated at lower voltages, but it must not be forgotten that the smaller the tube, the smaller the depositing surface. In this country they would probably standardise on 9-in. tubes. The question of up-draught and down-draught was one which had been very much debated both in this country and in America. The Americans claimed they obtained good results with the former, while here it was considered the latter was preferable. All the apparatus required could be obtained in this country.

Mr. REAVELL expressed the indebtedness of the members of the Chemical Engineering Group to the Manchester Section, and to the Chairman and Hon. Secretary in particular, for enabling the two sections to meet together that evening.

Unsecured Bonds of Former Austrian Government

THE attention of holders of unsecured bonds of the former Austrian Government is drawn to the provisions of the Annexe to Article 203, Part IX., of the Treaty of St. Germain, according to which holders of unsecured bonds of the old Austrian Government debt held outside the boundaries of Italy, Roumania, Czecho-Slovakia, Poland, or the Serb-Croat-Slovene State, or Austria as it exists to-day, shall deliver through the agency of their respective Governments to the Reparation Commission the bonds which they hold, and in exchange therefor the Reparation Commission shall deliver to them certificates entitling them to their due proportionate share of each of the new issues of bonds. British nationals who have not already lodged their bonds are requested to send them, together with the relative coupons, by registered post to the Administrator of Austrian Property, Cornwall House, Stamford Street, S.E. 1, not later than 3 p.m. on Monday, December 5, 1921, accompanied by a memorandum stating the name and address of the holder, the distinctive numbers and denominations of the bonds, and the date when the bonds were acquired.

Chemicals at the Imperial Fruit Show.

AMONG the exhibits of chemical interest at the recent Imperial Fruit Show were those of the British Sulphate of Ammonia Federation, Ltd., the Buxton Lime Firms Co., Ltd., of 11, Queen Victoria Street, London, E.C.4; Hawker & Betwood, Ltd., of Grays, Essex; Renny Forbes & Co., Ltd., of Alperton, Wembley; The Strawson Chemical Co., Ltd., of 79, Queen Victoria Street, E.C. 4; and Walter Voss & Co., Ltd., of Millwall, S.E. 14.

Research Work in Dyeing

Three Papers by Professor G. T. Morgan

PROFESSOR GILBERT T. MORGAN, D.Sc. (Department of Chemistry, of the University of Birmingham), who is an authority on the chemistry of dyeing, read three papers on research work in dyeing, at the first meeting of the session of the Birmingham and Midland Section of the Society of Chemical Industry at the Birmingham University, on Thursday, November 3. Dr. Brownsdon presided, and in his opening remarks appealed for the co-operation of all industrial chemists in order to make the session thoroughly successful. The papers were as follows :

(1) " 5-Amino-1 : 2-Naphtho-p-tolyltriazole " ;
(2) " Methyl-B-naphthylamine-6-sulphonic acid " ;
(3) " The employment of a new group of naphthalene intermediates in the production of azo—and disazo—dyes."

The co-workers of the professor in the research were Messrs. Sydney Chazan, Horace Samuel Rooke, and Hugh Gilmour.

Professor Morgan mentioned that in the distillation of coal tar there are six or seven products of material interest in connexion with the substances employed in the dye industry —benzene, toluene, phenol, cresol, naphthalene, and anthracene. From these crudes were obtained several hundreds of secondary products—intermediates—and then from those a vast number of synthetic dyes. Naphthalene was the most plentiful coal tar product, the proportion being equal to 10 per cent. of the distillation of the tar, while anthracene obtained amounts only to .4 per cent. In these circumstances it was not altogether astonishing that naphthalene played an important part in the production of dyes, and particularly of azo dyes. Not only was naphthalene the most plentiful of the residuals mentioned in coal tar distillation, but it was a much more active hydro-carbon than benzene.

Paper No. 1

In the search for derivatives of *B*-naphthylamine suitable for use as middle components of polyazo-dyes, B-naphthylamine was converted successfully into 5-Nitro-B-Naphthylamine, 1-toluene-*p*-azo-5-Nitro-2-Naphthylamine and 5-Nitro-1 : 2-naphtho-p-tolyl-triazole. The new nitrotriazole was then reduced to 5-amino-1 : 2-Naphtho-p-tolyltriazole in the hope that this *a*-Naphthylamine derivative would give rise to diazotisable para-azo-compounds, but it was found that the triazole group exerted steric hindrance on the adjacent 8-position so that entrant diazo-radicals took up position 6 giving rise to ortho-azo-compounds. Hence the new base, 5-amino-1 : 2-Naphtho-*p*-tolyltriazole, although unsubstituted in the para-position with respect to the amino-group, was nevertheless not utilisable as a middle or end component of complex azo-dyes. Its sparingly soluble diazonium chloride could, however, be employed as a first component of these colouring matters.

Professor Morgan pointed out that the hydrochloride of the aminotriazole ground into a thin cream with water and cooled to 0° gave a yellow insoluble diazo-compound on the addition of sodium nitrate. The diazo-solution from *p*-nitroaniline when added to an alcoholic solution of the aminotriazole hydrochloride (1 mol) yielded a sparingly soluble brownish-red azo-compound melting at 195-197° with decomposition. When oxidised with chromium trioxide in hot glacial acetic acid the azo-compound gave a brown bistriazole derivative, very sparingly soluble in the ordinary organic media ; this product softened at 210° and melted with decomposition at 220-240°. Acknowledgment was made to the British Dyestuffs Corporation, Ltd. (Manchester), for the facilities offered in carrying out the research.

Paper No. 2

The paper on Methyl-*B*-naphthylamine-6-sulphonic acid illustrated certain technical improvements recently effected in the manufacture of intermediates of the naphthalene series. Methylamine hydrochloride was now an article of manufacture, and this re-agent heated with *B*-naphthol-6-sulphonic acid (Schaffer acid) and aqueous caustic soda in the rotating autoclave—made from a munition shell—at 180-200°C. under a pressure of about 17 atmospheres led directly to the sodium salt of methyl-*B*-naphthylamine-6-sulphonic acid (methyl Brönner acid), an intermediate utilisable in colour production. Certain of these colours and other derivatives of methyl Brönner acid were described in the paper.

The starting materials in this research were commercial specimens of Schaffer salt and methylamine hydrochloride, and the former salt was recrystallised from water before employment in the following process. A rotating autoclave was charged with 150 grains of Schaffer salt, 75 grams of methylamine hydrochloride, 250 c.c. of 5 *N*-caustic soda, and 70 c.c. of water. This mixture was heated for 6-7 hours at 180-200°. The autoclave then contained a thick pasty mass of yellowish-white foliated crystals having a silvery lustre. This product, which became green on exposure to air, was purified by dissolving in 1,200 c.c. of boiling water; a small amount of a green sparingly soluble impurity being removed. This by-product (about 2 per cent.) was probably a dinaphthacridine derivative formed by condensation of 2 molecules of the product. The yield of recrystallised sodium methyl-*B*-naphthylamine-6-sulphonate was 72-74 per cent. obtained, as the average result of repeated preparations. The free sulphonic acid, precipitated by mineral acid from aqueous solutions of its sodium salt, was more soluble than Brönner acid. When pure the product was colourless, although it was often tinted with yellow owing to traces of impurities. On heating it changed perceptibly at 280° and melted sharply at 292°. The following derivatives were produced by double decomposition with metallic salts : calcium salt, barium salt, zinc salt, and magnesium salt. The copper, silver, and lead salts, yellowish white, sparingly soluble substances, were arranged in diminishing order of solubility. On warming an aqueous suspension of silver salt it decomposed with separation of metallic silver. The calcium and barium salts were more soluble in water than the corresponding salts of Brönner acid. The sodium salts of the two acids had approximately the same solubility. Details were then given of the azo-dyes prepared by coupling various diazo-derivatives with methyl-*B*-naphthylamine-6-sulphonic acid, and it was pointed out that the diaminostilbene azo-dye was much bluer in shade than the corresponding colour obtained by coupling with Brönner acid.

Paper No. 3

One of the authors (Professor Morgan and Mr. H. Gilmour) had previously prepared by circuitous methods a new group of substituted *a*-naphthylamines suitable for use as middle and end components of polyazo dyes. It had now been found possible to obtain these substances by the direct method outlined in the preceding abstract. *B*-naphthol is thus converted into methyl-*B*-naphthylamine, and its sulphonic acids, such as Schaffer acid, were similarly transformed into the corresponding methyl-*B*-naphthylamine-sulphonic acids. Methyl-*B*-naphthylamine and methyl-*B*-naphthylamine-6-sulphonic acids were converted into their arylsulphonyl derivatives. These compounds were then successively nitrated and reduced, thus giving rise to substituted *a*-naphthylamine derivatives containing the group $N(CH_3)\cdot SO_2Ar$ in the ortho-position to the amino group. These compounds were not only diazotisable, but were also capable of coupling with diazonium salts. Hence they could be used as first, middle, and end components of polyazo-dyes. As compared with *a*-naphthylamine itself they gave brighter shades of colour, some of the effects on silk being especially striking. The resulting dyes were well defined crystallisable substances readily isolated in a state of purity. The new substituted *a*-naphthylamines which contained sulphonic groups and were readily diazotised under works conditions in aqueous solutions represented a technical improvement over the older members of the series in which these groups were absent.

Chinese Substitute for Linseed Oil

THE British market (a correspondent states) hears little about an important product prepared by the Chinese from the wood oil nut, yet it is among the foremost vegetable oils used in the East. This oil possesses the property of rapid drying by oxidation, and so is a valuable substitute for linseed oil. It is also a preservative, and is used instead of paint by Chinese shipwrights, the wood treated with it carrying a bright lustre, whilst the residue, after extraction of the oil and carbonising, is used to mix with the oil for caulking purposes. The oil is also used for leather dressing, furniture polish, and lacquer-making, and enters into the composition which the Chinese employ for waterproofing their paper umbrellas. Chinese ink is manufactured from the burnt husks of the nuts after extraction of the oil.

Institution of Rubber Industry

Inaugural Meeting of Manchester Section

THE inaugural meeting of the Manchester Section of the Institution of Rubber Industry was held in the Midland Hotel, Manchester, on Monday. Mr. J. Mandleberg presided over a large attendance. Sir Charles Mandleberg, in a letter expressing regret for non-attendance, expressed his belief that the Institution had an undoubted career of usefulness before it, and that its meetings would not only be of advantage to its members by disseminating the most up-to-date information concerning the industry, but would also afford inventors opportunities of explaining their inventions at first hand.

The Chairman, in opening the proceedings, said that the rubber industry, unlike many other great industries, was hedged about by secrecy. Up to the present time every manufacturer had had his own mixings, his own methods, and his own secret processes, which had been jealously guarded. It might be that there were advantages in pursuing this policy. On the other hand, it might be a far better thing for the trade as a whole if they had some body where people engaged in the industry could meet together, and experts could express their views, and a general clearing-house of ideas be established. The technology of indiarubber was probably the most difficult in the world, and unless chemists knew what the real requirements of the factory were they would be working in the dark.

Plantation Rubber in the Factory

In a paper on the " Effect of Different Methods of Preparation on the Behaviour of Plantation Rubber in the Factory," Dr. H. P. Stevens said that in spite of all that had been written with respect to rubber preparation many manufacturers did not appreciate the basic principles underlying the coagulation of latex. This also applied to the treatment of the coagulum in the process of conversion into the form in which plantation rubber was usually marketed, namely, crêpe and sheet.

Milling Processes

Dr. Stevens dealt, in detail, with the problem of milling rubber, taking in order the different processes for the collection and preparation of the material and the possibilities of its adulteration. The general impression about crêpe rubber was that the paler its colour the better because it was less oxidised. The term " oxidation " used in that sense was unfortunate and misleading. While it was true that the dark colour was due to oxidation it did not follow that the dark rubber had undergone more oxidation than light rubber.

The lecturer then explained the composition of the rubber latex, and dealt with the use of sodium bisulphite, which inhibited the action of the enzyme and kept the rubber from darkening. The rubber was not bleached, the proportion of sodium bisulphite used being practically useless for that purpose, and it was also not injured in any way. There still appeared to be a prejudice among manufacturers with respect to acid coagulation, yet the proportion of acid required was only about 1 part in 1200, of acetic acid, and much less in the case of a mineral acid such as sulphuric acid.

Use of Organic Accelerators

A good deal had been heard recently about slab rubber, or rubber which had been coagulated with acid in a thick slab or sheet and then allowed to putrefy. In this case the putrefaction was subsequent to coagulation, but produced the same effect, namely, a more rapidly curing rubber. It was, of course, quite possible that a faster curing rubber would be a better vulcanising product. In the same way it was claimed that better results were obtained with organic accelerators owing to a shorter cure and reduced temperature of vulcanisation, but he (Dr. Stevens) could not see in what other way the rubber was superior.

The properties of fine Para rubber were then dealt with. The lecturer did not think a manufacturer should take exception to a consignment of sheet rubber because some of the sheets showed a little mould or mildew. He had made a good many tests, but could not detect any difference between clean and mouldy parts of the same sheet.

There was some evidence that rubber treated with sulphuric acid was rather more difficult to break down than rubber coagulated with acetic acid, and was also slower in vulcanising.

A discussion ensued in which Sir Henry Wickham, Captain Buckleton, and Messrs. J. H. C. Brooking, Gray, Louis, Tanner, Fordyce Jones, Lynton, and Ferrara took part.

Institution of Chemical Engineers

Provisional Committee Formed

AT a meeting, preceded by an informal dinner, at the Engineers' Club, London, on Wednesday, it was decided to take steps to form an Institution of Chemical Engineers. Sir Arthur Duckham presided over a company of nearly a hundred, those interested having come from all parts of the country, even as far as from Glasgow. Among those present were Mr. W. J. U. Woolcock, M.P. (Association of British Chemical Manufacturers), Mr. W. Macnab, Mr. J. A. Reavell, Mr. W. T. Dunn (Institution of Gas Engineers), Professor J. W. Hinchley, Mr. H. Talbot, and many members of the Chemical Engineering Group of the Society of Chemical Industry.

Sir Arthur Duckham, in opening the meeting, said it seemed to him that the only objection to the formation of the proposed Institution of Chemical Engineers was that it meant another institution to subscribe to. In that they would be increasing the disease instead of curing it, but perhaps it would be all to the good in the long run inasmuch as it might bring them more quickly to the time when all the engineering institutions would be amalgamated into one, the various branches of engineering then being dealt with in sections of one central organisation. Nobody could deny that there was need for a body which would watch over the training of the chemical engineer, who, in the real sense, did not exist at the present time. That was one of the strongest arguments for having the proposed institution. There were many other good reasons for the step it was proposed to take, which had received a considerable amount of support from all over the country. In particular, he wished to refer to a letter which had been received from Professor F. G. Donnan, who was heartily in sympathy with the proposal.

An Inevitable Movement

Professor J. W. Hinchley said the question they had to consider was whether this was the right moment to form an Institution of Chemical Engineers, because there was no question that it would have to come eventually. Personally, he thought it was, and judging from the large number of letters that had been received from almost every chemical works in the country that was the general feeling. Indeed, the question was not whether they ought to start now, but whether they ought not to have started earlier, and he had been told by the people in the North that if something was not done in London at once something would be done in Manchester. There had been great progress in all branches of engineering in recent years, but we were only just beginning to see the possibilities of chemical engineering in this country. Examples were to be seen all over the country of the vast improvement in works practice wherever there was a sound application of chemical engineering. It did not follow, however, that even if a man were a good engineer and a good chemist, he was a good chemical engineer, because it needed special study of the special plant employed in the chemical industry to make a good chemical engineer, and this did not come within the study of the ordinary engineer. Therefore, there was a great deal to be done in organising the education of the chemical engineer, which only an institution such as that proposed could do. There need be no confusion between the new Institution and the Chemical Engineering Group, the Society of Chemical Industry, or the other bodies connected with the chemical industry, because it was proposed to work on different lines from any of the existing bodies. It was not suggested that the chemical engineer would supplant the engineer or the chemist, because no one man could be satisfactory in all three capacities.

Mr. W. J. U. Woolcock, M.P., proposed " that the formation of an Institution of Chemical Engineers is desirable." Personally, he thought it was, and he failed to see how it could conflict in any way with the existing institutions and associations. Both America and Germany were ahead of us in regard to chemical engineering generally. There was undoubtedly room for such an institution for the education of chemical engineers. Another thing was that we were going to live in a world which was rather difficult, and would remain so for many years, and, that being so, it became all the more necessary that chemical engineers should not hide their light under a bushel. Therefore, it was essential to raise the status of the chemical engineer, which would be an important function of the new institution.

Mr. F. M. Rogers seconded the proposal, and it was carried unanimously, after some remarks by Captain Goodwin, who suggested that it would be desirable to have one Institution

of Chemical Engineers for the whole of the English-speaking races. The American Institution of Chemical Engineers intended to change its name to *The* Institution of Chemical Engineers, and it would be well if some arrangements could be made for collaboration with that body.

Professor Hinchley said that they had been in communication with the American Institution, and had been promised every assistance. A matter of this kind, however, was best left to the provisional committee when it was formed.

Mr. F. A. Greene proposed, and Mr. D. Brownlie seconded, "that a provisional Institution be hereby formed." The proposal was carried unanimously.

Mr. J. A. Reavell proposed, and Mr. W. Macnab seconded, "that a provisional committee of indefinite number, with power to co-opt, be elected at this meeting." In seconding, Mr. Macnab said it should be the duty of the Committee to investigate the best means of getting to work, whether by amalgamation with some existing body or by starting a new one. The motion was carried unanimously.

It was agreed that the provisional committee should consist of Sir Arthur Duckham and Messrs. Woolcock, Rogers, Greene, Brownlie, Reavell, Macnab, Talbot and MacGregor.

Society of Chemical Industry

London Section's Joint Meetings with Other Bodies

At the first meeting of the session of the London Section of the Society of Chemical Industry on Monday, November 7, Mr. E. V. Evans, the chairman, said that the Section had had the misfortune to lose by death Mr. E. J. Bevan, who was analyst to the Middlesex County Council, and collaborator with Mr. C. F. Cross in his work on cellulose.

Referring to the work of the Society and the Section, Mr. Evans said that Sir William Pope had been elected Chairman of the Council, but that Dr. R. F. Ruttan, President of the Society and Professor of Chemistry at the McGill University, Montreal, would attend the Annual General Meeting of the Society in Glasgow in July, to which also a large number of Canadian members had expressed an intention of coming. At that meeting it was hoped to have the first Messel Memorial Lecture. Among the arrangements for the London Section during the coming session was a paper from the Rothamsted Experimental Station, on the use of activated sludge for agricultural purposes, a joint meeting with the Chemical Industry Club, and a joint conference with the Chemical Engineering Group, probably on smoke abatement.

The Producer Gas Process

Mr. N. E. Rambush then read a paper entitled "Comparisons between laboratory fuel and tests practical working results of the Producer Gas Process." The main argument in the paper was that the ordinary fuel test, particularly in regard to the volatile content determination, was generally insufficient to enable one to predict the gasification products. On the other hand, a distillation test carried on with a reasonably large quantity of fuel would generally give all the information required by the chemical or gas engineer to determine, without large-scale tests, the thermal efficiency, the quality of the gas, and the possible yield of by-products from various coals, as well as the type of plant to be employed.

The paper briefly described a distillation test which had been evolved by the author, in which he uses two kilos of fuel, the process taking from four to six hours. By such a test it was claimed that, by means of a thorough laboratory investigation of the behaviour of fuels on distillation, it was possible to predict the thermal efficiency, the tar yield, and the ammonia recovery from particular coals in practice. For instance, it was shown from actual results that a tar recovery of 80 per cent, could be obtained with the present apparatus, and that even higher yields were possible with slight modifications of the present testing plant. Another conclusion which the author had drawn from his experience with this test was that in a very short time it would be possible to determine the heating value of the gas from particular coals.

Figures of a number of experiments were given and compared with results obtained on actual producer plants, and the relationship between them was shown to be extremely near. The general conclusions drawn by the author from his experience of this test, in relation to its bearing on the type of plant required, were that for fuels of a fine grading large gasification areas were required in the plant, in order to avoid blowing the dust away. Fuels of high caking properties required to be mechanically stirred, whilst fuels of high tar yield should always be gasified, if possible, at low temperatures to get the highest yield of light tar oils.

It must not be forgotten, the author added, that when we obtained tar from coal we obtained gold and silver, inasmuch as a B.Th.U. in dry tar was worth far more than a B.Th.U. in coke. Fuels that contained a high percentage of moisture required a deep fuel bed, otherwise the sensible heat of the gases was not properly utilised. At the same time, he recommended that fuels should be dried before being tested on the lines of the distillation test. Another feature which had come to light in the experiments was that a higher tar recovery was obtained when dealing with nuts, and that the content of tar could not be guessed from the content of volatile matter.

The details of the author's testing apparatus were not seriously challenged in the discussion which followed the paper, but emphasis was laid upon the importance of arriving at a test of this nature which would be generally acceptable to commercial engineers. A special point brought out by Mr. W. H. Patchell was the need for closer investigation of the fusibility of the ash in fuel, a point which, he said, was very seldom, if ever, brought out in the usual fuel analyses.

Elimination of Oilfield Waste

Paper by Mr. A. Beeby Thompson

In the course of a paper on the above subject, read before the Institution of Petroleum Technologists, at the Royal Society of Arts, on Tuesday evening, Mr. A. Beeby Thompson said it was not easy to discriminate between legitimate and excusable losses and unjustifiable waste, but in the development of no mining industry had such waste been witnessed as in oil-fields. In most types of mining, uneconomical extraction did not necessarily entail ultimate loss of minerals, but in the case of petroleum all unrecovered products were permanent losses. Mr. Thompson called attention to the chief sources of oil-field losses, and gave a brief description of the methods for reducing losses, improving extraction ratios, and lowering costs. No solution appeared imminent for eliminating certain classes of waste unless competition was removed, but as competition was essential to industry and was also the incentive of invention and initiative, its substitution by other tactics would tend to stifle progress. By co-operation, however, incalculable savings would result in such works as power generation and lighting stations, water supplies, vacuum plants, topping stills, gas-gasoline extraction, oil storage, and pipe lines.

Differentiating between underground and aboveground losses, the lecturer said the former arose from such factors as uneconomical location or spacing of wells; passing oil and gas sources of questionable value in search for more prolific; failure to exclude water from oil and gas sands, either unnoticed or temporarily neglected; unsuitable or incomplete extraction methods. Aboveground losses resulted from uncontrolled gushers, soakage, and evaporation of oil, uneconomical method of extraction, and negligent handling of wells and production.

Where drilled wells failed to give a profitable production of oil the following methods for artificially stimulating the contents of oil sands and recovering their dregs were possible—washing out the oil sands with water or solvents; applying a vacuum to wells; activating the oil or expelling the contents with compressed air or gas; fracturing the oil-bearing sands by explosives; and mining the oil measures.

The evaporation losses sustained by light oils were very high, but even heavy oils and those with small volatile contents suffered loss by negligent handling and needless exposure. Another common source of waste was the existence of emulsions consisting of intimately mingled water, oil, and fine mineral particles that resisted separation without special treatment, and even quasi-emulsion that ould be treated by heating, steaming, or centrifuge were often thrown away. Some of the heavy black, asphaltic oils of .900 to .970 sp. gr. often contained up to 10 and 20 per cent. of water that could not be detected without special examination, and its presence might be first noted in the refinery. Much trouble was then experienced through frothing and deposition of mineral salts

in the stills as the water holding the salts or solution was expelled by evaporation. In one case an oil containing 8 per cent. of water with 3 per cent. salts was actually depositing half a ton of solids per day, to the serious detriment of the working and life of the stills, especially as some magnesium chloride was being concurrently decomposed, forming hydrochloric acid. The electrical process, said Mr. Thompson, had so far proved most satisfactory to breaking down refractory emulsions.

Many scientists were now working on the problem of utilising to advantage the gas now being allowed to escape on oil-fields. In this connexion the lecturer suggested the fixation of atmospheric nitrogen; the isolation of special constituents such as helium, the development of such local industries as glass-making, lime burning, cement works, &c., and the production of carbon black, as some of the possible uses to which gas relieved of its condensable products could be put. The only feasible alternative to these schemes, which were applicable only to special cases, was that of returning unused gas to the earth and re-charging exhausted sands.

Chemical and Drystuff Traders

Further Correspondence with Licensing Committee

THE Chemical and Dyestuff Traders' Association has had further correspondence with the Board of Trade respecting the refusal of the Dyestuffs Advisory Licensing Committee to issue licences applied for by merchants. In one of the cases taken up some interesting figures are given in reference to the wide disparity between foreign and British prices for certain dyestuffs.

Recently a member of the Association applied for a small quantity of a certain dye, his own selling price of which was 3s. 3d. per lb. delivered free to customer's works in 2 cwt. lots. The licence was refused on the ground that British makers make a similar product and two names were given. The first home maker quoted 15s. 3d. per lb. delivered at the merchant's address, but afterwards reducing it to 13s. per lb. On writing to the Committee informing them of this the applicant was informed that they were only prepared to consider applications for licences based on a difference in price between the British and the foreign products from the actual consumers concerned. The applicant in question later received a more favourable quotation from another firm of British dyestuff manufacturers, but even on their figure he could not afford to sell at less than 11s. per lb. delivered at customer's works. In this case, therefore, the British consumer of dyes would be paying 11s. per lb. instead of 3s. 3d. per lb., at which the goods could be obtained from foreign sources.

This matter has been taken up once more with the Board of Trade, and the official reply is as follows:—

"With reference to your letter of October 25 regarding an application for a licence to import a certain dye, I am directed by the Board of Trade to state that they understand that, following the accepted practice, the Dyestuffs Advisory Licensing Committee have laid it down as a general rule for their guidance that any application for a licence to import a particular dyestuff, based solely on a difference in price between the foreign and the British material, can be considered only when made by the actual consumer concerned, who is obviously the only person in a position to furnish evidence as to the effect of this difference in price on his total cost of production, and thus to show whether or not the difference places him in an unduly disadvantageous competitive position."

Key Industries: Objections to the List

The Association has been busily engaged in questions arising out of the Safeguarding of Industries Act, and has caused a number of questions to be put to Ministers on the subject in the House of Commons.

With respect to the Key Industries List, a Joint Committee has this subject now under consideration, and the Association, which is represented on the Committee, is collecting a considerable body of information from its members as to the articles to which objection is taken. The objections cover a very wide field and are being tabulated for submission in due course to the authorities, but the following will indicate the class of objection which is being urged against the list.

To take the case of copper chloride crystals for commercial purposes, used as a mordant for certain colours in dyeing and calico printing, it is pointed out that this article is not largely used, but for certain purposes it is a very necessary adjunct, and as there is no actual British competition the inclusion of it in the list simply means that the cost to the English consumer is increased by 33⅓ per cent.

Carbon tetrachloride, again, which is largely used as a solvent in the textile and paint trades, is regarded as purely an industrial product, and should, therefore, not be subject to duty.

In another case carbonate of potash 99½ per cent. and hydrated carbonate potash were stopped by the Customs and judged liable to duty. It is strongly urged that both of these articles should not be liable to duty, as they are clearly raw materials to be used in industries, the former by manufacturing chemists, brewers, chocolate manufacturers, etc., and the latter largely by glassmakers.

In another case calcium chloride, hypo soda large crystals, and saponine were stopped by the Customs but eventually passed. The reasons which apply to the previous case are urged as equally applicable to these articles also.

Strong objection is also taken to being charged, in the first place, *ad valorem* duty on compound artificial perfumes, which, as they are an admixture of various chemicals and other products, have lost commercially their identity; and also to paying *ad valorem* duty on goods which only contain 30 per cent. of dutiable articles such as anthracene, for example.

Affairs of Benzoates, Ltd.

THE first meeting of the creditors of Benzoates, Ltd., 113, High Street, Watford, Herts, was held on Tuesday, at 29, Russell Square, London, W.C.1. The business was commenced by Albert William Hings and Vivian Claude North, and was carried on by them until early in 1918 under the style of Benzoates. Early in 1918 the business was formed into a company called Benzoates, Ltd., to manufacture fine chemicals, but chiefly at that particular time to utilise by a special process, and to treat the waste residue from explosives, from which refined benzoic acid could be manufactured. The company appeared to have carried on prosperous business until the failure of their supply of raw products. The Official Receiver, after having dealt with the proofs of debt lodged, said he had not yet been able to issue to the creditors the usual summary. There were matters which would have to be considered by the liquidator, when appointed, both as regards to trading and dealing in shares. The statement of affairs showed unsecured liabilities £6,246 18s. 11d. The assets were returned at £21 17s. 9d., and there appeared to be no free assets out of which any dividend could be paid to the unsecured creditors. As regards contributories, the paid-up capital was £3,552, and there was a total deficiency of £9,877 1s. 2d. The meeting was adjourned in order that the question of appointing a liquidator and committee of inspection could be considered.

The Structure of Organic Crystals

AT a meeting of the Physical Society of London, held at the Imperial College of Science, South Kensington, yesterday, Sir W. H. Bragg delivered his presidential address on "The Structure of Organic Chemicals." For many reasons, he pointed out, the structure of crystals of organic substances invited examination by the methods of X-Ray analysis; but their molecular complexity would seem to throw great difficulties in the way. It was possible, however, that the difficulties in the case of aromatic compounds might be surmounted by adopting a certain hypothesis, viz., that the benzene or naphthalene ring was an actual structure, having definite size and form, and that it was built as a whole into the organic substances in which it occurred. Reasons could be given why this was *a priori* probable. The examination of certain organic crystals had been made. The results were in general agreement with the hypothesis, and led to various deductions of interest.

Slate Flour

A CORRESPONDENT, who is interested in the utilisation of slate flour and its possible applications as have recently been referred to in our columns, is anxious to get in touch with persons in this country who have full data in connexion with such items as preparation and grinding. If any of our readers have the necessary information we shall be glad to hear from them, so that we may put them in touch with the inquirer.

Society of Public Analysts

"Testing of Foodstuffs for Vitamins"

At the ordinary meeting of the Society of Public Analysts, held on Wednesday, November 2, at the Chemical Society's rooms, London (Mr. Alfred Smetham, president, in the chair), certificates were read for the first time in favour of Messrs. Jack Cecil Drummond, D.Sc. (Lond.), F.I.C., Alfred William Long, John Charles Mellersh, Charles Harold Wright, M.A. (Cantab.), F.I.C.

Messrs. James Frederick Fothergill Rowland, B.A. (Cantab.), A.I.C., and William Norman Stokoe, B.Sc. (Lond.), A.I.C., were elected members of the society.

Abstracts of Papers

In a paper on "The Testing of Foodstuffs for Vitamins," by Messrs. J. C. Drummond, D.Sc., F.I.C., and A. F. Watson, B.Sc., A.I.C., the authors suggested that sooner or later analysts must seriously consider the standardisation of methods for ascertaining the value of foodstuffs as sources of those unidentified dietary units—vitamins. They stated that there is already a big demand for information on the testing of food products, but unfortunately as yet the chemical nature of the vitamins is not sufficiently understood to enable chemical or physical methods of estimation to be employed, and for the present the biological method is necessarily utilised. The many sources of error in such a method were pointed out, particularly those caused by the variability of response in individual animals, and the influence of external factors, although the authors noted that these have been considerably reduced by recent improvements in technique.

Good equipment and organisation of the feeding laboratory and scrupulous care in preparing the "pure" foods for the basal diet were shown to be essential, and the practice in the authors' laboratory was described in detail, illustrated by lantern slides.

The authors also dealt with the testing of foodstuffs for the three recognised substances of the vitamin "class," and demonstrated the type of result obtained. In conclusion, they showed the value of the method in studying the seasonal variation in the food value of butters and milk, and discussed the significance of these new discoveries from the analyst's point of view.

Mr. C. Butler Savory, M.D., M.Ch., in a paper on "An Improved Specific Gravity Apparatus," demonstrated a new and efficient instrument for the determination of the specific gravities, which has a range from 0.2 to 1.9, and obtains direct results, without calculation, to four decimal points.

Manufacturers and Key Industries

On Monday the Administrative Committee of the National Union of Manufacturers considered recent articles in the daily Press in reference to safeguarding of industries, anti-dumping, &c., and decided to protest against the attitude towards, and the publicity given to, the views expressed on these subjects by the fancy goods section of the London Chamber of Commerce. The Administrative Committee are of opinion that industry in this country will not be able to find employment for the normal number of workers until effect has been given to Part II. of the Safeguarding of Industries Act, and that as a necessary supplement, the Merchandise Marks Act, as recommended by the Merchandise Marks Committee, should be placed on the Statute Book so that the people should know the origin of the goods bought in this country.

French Society of Chemical Industry

The Société de Chimie Industrielle send us a report on the Chemical Exhibition which, as was announced in The Chemical Age at the time, was held in Paris last month. The exhibition was visited daily by a large number of people, and appears to have been in every way a conspicuous success.

Speaking at the annual meeting of the Société de Chimie Industrielle, which, it will be recollected, was held concurrently with the exhibition, the President (M. Paul Kestner), referring to the presence of distinguished chemists from the United Kingdom and other countries, said it was an indication of the desire to continue in peace-time the close collaboration which existed between chemists of the Allies during the war. He also laid great stress on the necessity of developing the relation between pure and applied chemistry.

Chemical Matters in Parliament

Import Duty on Menthol

Lieut.-Colonel Nall (House of Commons, November 4) asked the President of the Board of Trade whether menthol (crystals) was scheduled under the Safeguarding of Industries Act as dutiable; to what extent this article was produced in this country; and what key industry was protected by its inclusion?

Mr. Baldwin said menthol was included in the list of chemicals which were dutiable under Part I. of the Safeguarding of Industries Act as being a fine chemical, and he had no power to exclude from the operation of that Act any commodity covered by any of the headings in the schedule thereto. The commodity was not, so far as he was aware, produced in this country. In view of certain information placed before his Department within the last few days, the question of the grades of menthol liable to duty was now under review.

Customs Formalities

In reply to Mr. Galbraith (House of Commons, November 3), Mr. Young said it was not necessary for declarations by limited liability companies under the Safeguarding of Industries Act to bear the seal of the company, and the signatures of two directors and the secretary. The Customs regulations provided that, in the case of limited liability companies, the declarations on entries for goods liable to reparation levy or to duty under Part I. of the Safeguarding of Industries Act must be made by the managing-director or secretary without authorisation under the seal of the company. Moreover, such an officer of a company must give standing authority in writing to a shipping agent to make such declarations on behalf of the company.

Customs Delays

Captain Wedgwood Benn (House of Commons, November 7) asked the President of the Board of Trade whether any complaints had been received regarding the delay in delivery of goods due directly or indirectly to the Safeguarding of Industries Act?

Mr. Baldwin said a few complaints had been received that the passage of goods through the Customs was being delayed pending decisions as to liability to duty, but he was informed that arrangements for obviating such delay had now been made.

Development of New Industries

In reply to Captain Wedgwood Benn, who asked whether any of the articles protected under Part I. of the Safeguarding of Industries Act were not manufactured in the British Empire; and, if so, what preparations were being made to manufacture such articles, Mr. Baldwin (House of Commons, November 7) said some of the articles chargeable with duty under Part I. of the Act were not being manufactured in the British Empire at the time of the passage of the Act. The object of that part of the Act was, however, to encourage the development of the industries to which it related, and the extension of their range of production, and he was informed that a number of manufacturers were already taking steps in the direction indicated.

Anti-Dumping Regulations

Replying to Captain Wedgwood Benn (House of Commons, November 7), Mr. Baldwin said no orders had yet been made under Part II. of the Safeguarding of Industries Act.

German Reparation (Recovery Act)

In reply to Captain Wedgwood Benn (House of Commons, November 7), Mr. Young said the amount received under the German Reparation (Recovery) Act up to November 2 inclusive was £1,470,797.

Discharge from Bankruptcy

At the London Bankruptcy Court last week Ernest George Hill, company director, late of Fenchurch House, 5, Fenchurch Street, E.C., applied for an order of discharge from the bankruptcy recorded against him in February last (*see* The Chemical Age, Vol. IV., p. 336, and Vol. V., p. 23). The only bankruptcy offence found against the debtor was the fact that the assets were less than 10s. in the £. The Registrar granted the discharge subject to a suspension of four weeks.

From Week to Week

Mr. J. E. HUMPHRIES, B.A., has been appointed an assistant lecturer in chemistry at Aberdeen University.

The resignation of MR. P. A. COOPER, assistant lecturer in physics at Manchester University, is announced.

Professor Soddy delivered the first of two lectures on "The Bearing of Physical Science on Economics," at the Birkbeck College, London, on Thursday evening.

Samples of the company's "SUPER-FUEL" were shown in use at an extraordinary general meeting of the Reliance Fuel Co., Ltd., at Llanelly yesterday (Friday).

COUNCILLOR ERNEST SANGER, a partner in the firm of Sangers, wholesale druggists, of 258, Euston Road, N.W. 1, and a member of the London County Council, has been elected Mayor of St. Marylebone.

Sir Robert Horne was, on November 5, elected RECTOR OF ABERDEEN UNIVERSITY, in succession to Lord Cowdray, the voting being: Sir R. Horne (C.U.), 557; Sir Donald Maclean (L.), 400; and Professor F. Soddy (Lab.), 253.

The death occurred on Monday, at 57, Montgomerie Street, Glasgow, of Mr. John Todd, aged fifty-two, manager to George MacLellan & Co., Ltd., rubber manufacturers. The interment took place on Thursday afternoon.

With the exception of the first year chemistry, the LECTURES AND LABORATORY WORK of Edinburgh University are now being conducted in the new King's Buildings, Edinburgh. Next year all the work will be transferred there.

THE MARQUESS OF CREWE will preside at the annual dinner of the Old Students' Associations of the Imperial College of Science and Technology, South Kensington, to be held on Thursday, November 24, at the Trocadero Restaurant, London, W. 1.

The Sheffield Association of Metallurgists and Metallurgical Chemists had a successful MUSICAL EVENING AND EXHIBITION last week at the Royal Victoria Hotel, Sheffield. An interesting exhibit showed the various uses to which Stainless Steel could be put.

AN EXHIBITION OF FOREIGN SAMPLES held in the board room of the Liverpool Chamber of Commerce on Wednesday, Thursday, and Friday included chemicals, drugs, paints and varnishes, and scientific instruments of French, German, Japanese, Spanish, and United States' manufacture.

In a report to the Department of Overseas Trade, Mr. Norman King, H.M. Consul-General in Mexico, states that there APPEARS TO BE A DEMAND there for caustic soda; cyanides; chemical products used in mining operations and in the manufacture of soap; perfumery; and glassware.

THE COMPAGNIE COMMERCIALE DU NORD (GREAT BRITAIN), LTD., of 54, Gracechurch Street, London, E.C. 3, have been appointed general agents for the United Kingdom of The Umea Tjarexport A/B, Umea, for their PEASANT-MADE STOCKHOLM WOOD TAR of the well-known brand "U.T.A.B."

A party of members of Parliament visited the works of LOW TEMPERATURE CARBONISATION, LTD., near Barnsley, on November 4, at the invitation of Major C. G. C. Hamilton, M.P., and Close Brothers & Co. The party spent nearly three hours at the plant, inspecting and discussing the process.

At the inaugural meeting of the 168th session of the ROYAL SOCIETY OF ARTS, held on November 2, the Society's medal was presented to Sir Dugald Clerk, Sir Herbert Jackson, Sir Daniel Hall, and Sir Oliver Lodge, for their Trueman Wood Lectures. Medals were also presented, for papers of chemical interest, to Mr. A. F. Baillie, Dr. W. Cramp, Mr. W. Raitt and Sir Charles H. Bedford.

A general monthly meeting of the members of the ROYAL INSTITUTION was held on Monday afternoon, Sir James Crichton-Browne, Treasurer and Vice-President, in the chair. Dr. W. A. Bond was elected a member. The special thanks of the members were returned to Mrs. Williams for her gift of personal notes of Davy's Lectures at the Royal Institution made by Thomas Harrison (secretary R.I. 1813-24) and twenty-two books of the works of Cicero, Horace, Hippocrates, and Waring, formerly in his possession. The Chairman reported the deaths of the Earl of Ducie, Mr. J. H. Balfour Browne, and Professor G. Lippmann, and resolutions of condolence with the families were passed.

Mr. H. Bourgeois, chemical merchant, 18-19, Great St. Helen's, London, announces that he has appointed Messrs. Alexander Cross & Sons, Ltd., 19, Hope Street, Glasgow, as his agents for Scotland for the sale of anhydrous ammonia, which the firm is in a position to supply at very reasonable prices for immediate delivery.

In Congregation of Cambridge University on November 5 it was agreed to present AN ADDRESS TO DR. G. D. LIVEING, professor of chemistry from 1861 to 1908, who matriculated on November 13, 1846, as a member of the university, and who has resided in the university every term since that date. The address was read by the Public Orator and was received with applause.

The Department of Overseas Trade announces that Mr. A. ABBOTT, H.M. Consul at Sao Paulo, who is now on leave in this country, will be returning to Sao Paulo towards the end of November, so that firms desirous of interviewing him should apply, as early as possible, to the Department of Overseas Trade (Latin-American Section), 35, Old Queen Street, S.W. 1.

We regret to record the death, on November 3, of MR. RICHARD LLOYD WHITELEY, of 65, Birmingham Road, West Bromwich. Mr. Whiteley, who was sixty-one years of age, was a Fellow of the Institute of Chemistry, and had been a member of the Society of Chemical Industry since 1885. The interment took place at the Wesleyan Chapel, West Bromwich, on Tuesday.

The following officers of the ROYAL SOCIETY OF EDINBURGH have been elected for the ensuing year: PRESIDENT, Professor F. O. Bower; VICE-PRESIDENTS, Sir George A. Berry, Professor W. Peddie, Sir J. A. Ewing, Professor J. W. Gregory, Dr. W. A. Tait and Major-General W. B. Bannerman; GENERAL SECRETARY, Dr. C. G. Knott; SECRETARIES TO ORDINARY MEETINGS, Professor E. T. Whittaker and Professor J. H. Ashworth.

In connexion with the Institute of Chemistry a lecture on "MODERN APPLICATIONS OF CHEMISTRY TO CROP PRODUCTION" is to be given by Dr. E. J. Russell in the Chemical Lecture Theatre of King's College, London, on Monday next at 8 p.m. The lecture, which will be presided over by Mr. A. Chaston Chapman, will be open to all fellows, associates, and registered students of the Institute, and to all chemical students in recognised colleges.

The following papers will be read at a meeting of THE CHEMICAL SOCIETY on Thursday, November 17, at 8 p.m.:—"The influence of nitro-groups on the reactivity of substituents in the Benzene nucleus. Part V. Heteronucleal dinitro-derivatives," by H. Burton and J. Kenner; "Organo-derivatives of bismuth. Part V. The stability of halogen, cyano-, and thiocyano-derivatives of tertiary aromatic bismuthines," by F. Challenger and J. F. Wilkinson; and "Organo-derivatives of bismuth. Part VI. The preparation and properties of tertiary aromatic bismuthines and their interaction with organic and inorganic halogen compounds," by F. Challenger and L. R. Ridgway.

At a meeting of the University of Birmingham Chemical Society held on Monday, October 31, Mr. J. D. Main Smith, B.Sc. (London), read a paper on "Chemical Affinity." He pointed out that at the present time a great deal of confusion between valency and residual affinity existed. It had been shown that atoms could carry electrical charges, and Sir J. J. Thomson, in 1908, developed his electrical theory of valency. The unipolarity of chemical affinity was postulated and hence followed an explanation of the distribution of force round an atom. Residual affinity was identified with distributed valency force and co-ordination numbers with neutral attracted atoms. Evidence of the amphoteric nature of hydrogen was adduced and the constitution of reducing agents explained. The application of the electrical theory to cover the laws deduced by Werner and to the laws of ionic reaction was described in detail.

Government Contracts

The following were among the Government Contracts let during September:—

AIR MINISTRY.—*Refills for Fire Extinguishers:* General Fire Appliance Co., London, E.C.; Minimax, Ltd., Feltham.

CROWN AGENTS FOR THE COLONIES.—*Paint:* Wilkinson, Heywood & Clark, London, W.C.; Torbay Paint Co., Ltd., London, E.C.; International Paint Co., London, E.C.; Docker Brothers, London, E.C. *Quinine:* Howards & Sons, Ilford. *Sanitas Okol:* Sanitas Co., Ltd., London, E. *Tonite:* Christopher & Co., Wigan.

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Abstracts of Complete Specifications

169,738. Extraction of Oils from Vegetable Matter, Process and Apparatus for. M. Whitehead, 134, Stoneferry Road, Hull, and E. Scott, 137, Westbourne Avenue, Hull. Application date, April 7, 1920.

The apparatus is for the extraction of oils from crushed seed or the like by means of a volatile solvent. The crushed material is fed into the inlet *a* of a conduit *b* having a rotary screw conveyor which conveys it to a delivery pipe f^1, leading to a tank g^1. The material is supported on an oblique screen of foraminous material, and is subjected to the action of spirit supplied by the pipe j^1. The mixture of spirit with the oil extracted is drawn off through the pipe k^1. An inclined conduit, m^1, opens into the tank just above the lower end of the screen h^1 and contains an endless conveyor n^1. Another inclined conduit q^1 opens into the tank below the screen h^1 and the wall separating the two conduits is formed of foraminous material at the upper end. The crushed material is conveyed through the conduit m^1 and some of the mixed spirit and oil drains into the conduit q^1. The remainder of the oil mixture is expressed by the rollers l^1 (shown enlarged in Fig. 3), and returns through the conduit q^1. The crushed material passes by the pipe f^2 to another tank g^2, where the extraction process

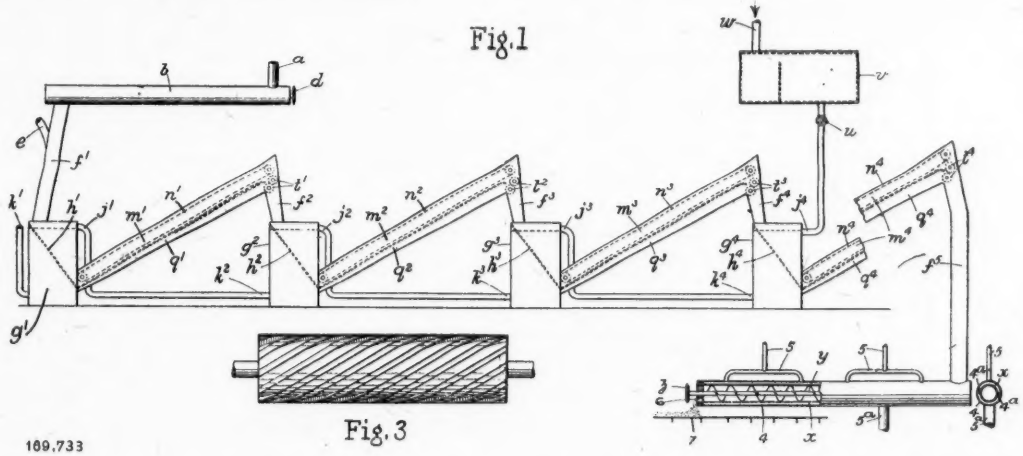


Fig. 1

Fig. 3

169,733

is repeated, and thence to similar tanks g^3 and g^4. Spirit is supplied from a tank *v* to the tank g^4 and passes through the apparatus in the opposite direction, so that the extraction process is progressive and continuous. The crushed material is finally passed through a pair of rollers l^4, and then to a perforated conduit *x* containing a screw conveyor *y*. The conduit *x* is surrounded by a casing 4 and the annular space is divided into two halves by horizontal partitions. Steam is introduced into the lower space thus formed by a pipe 5^a so that it passes into the crushed material and extracts the remaining traces of the solvent which passes off with the steam into the upper part of the annular space. The oil is finally recovered from the solvent by distilling the mixture, and the recovered solvent is supplied to the tank *v* for use again. This apparatus avoids the usual lengthy soaking of the crushed materials and the labour of excavating the spent material from the extraction vessel.

169,732. Compounds of the Anthraquinone Series. F. W. Atack, of British Alizarine Co., Ltd., Trafford Park, Manchester, and G. W. Clough, Denstone, Chatsworth Road, Eccles. Application date, March 31, 1920.

The process is for obtaining β-chlor-derivatives of anthraquinone from the corresponding α-chlor-derivatives by heating the latter to about 200°C. with concentrated sulphuric acid. The reaction is applicable to chlor compounds (with or without an amino group) or brom compounds not containing an amino group in the same nucleus as the bromine atom provided that a β-position is vacant in the meta position to the halogen substituent. The β-positions of the anthraquinone nucleus are those numbered 2, 3, 6, 7, and the halogen atom finally occupies the meta position with respect to its original position. The reaction is also applicable to α-chlor-anthraquinones which contain other substituents such as sulpho-groups or amino-groups. Bromine compounds which may be treated are 1-brom anthraquinone or α-brom anthraquinone containing sulpho groups, or α-brom-amino-anthraquinones having the amino group in a different nucleus from that containing the bromine atom. Examples are given of the conversion of 1-chloro-anthraquinone or 1 : 5-dichloro-anthraquinone into 2-chloro-anthraquinone, 1 : 6-dichloro-anthraquinone into 2 : 7 dichloro-anthraquinone, and the corresponding reactions with bromine compounds.

169,741. Cellulose Acetate Products, Treatment of. British Cellulose and Chemical Manufacturing Co., Ltd., 8, Waterloo Place, London, S.W. 1, and J. F. Briggs, of British Cellulose and Chemical Manufacturing Co., Ltd., Spondon, near Derby. Application date, April 29, 1920.

The object is to render filaments, threads or fabrics made from cellulose acetate suitable for dyeing, directly or with the use of mordants, with any dyes such as substantive dyes, acid or basic dyes, vat dyes or sulphur dyes. The process is applicable to materials made with lower cellulose acetates having a combined acetyl content of about 2 to 2.5 acety groups per molecule of cellulose and not prepared by alkaline saponification of higher cellulose acetates. The material is subjected to a superficial saponification with a very dilute alkaline saponifying agent. The quantity of the latter is so limited that the decrease in weight due to saponification is not more than about 5 per cent. The saponifying agent is preferably caustic soda of about 0.1 per cent. strength and the temperature should be about 70°–75°C. Under these conditions the strength, elasticity and other properties are retained. The amount of the saponifying agent used may be varied to regulate the shade of dyeing required. The saponification may be effected in a separate preliminary operation, which may be followed by other desired chemical or mechanical operations. Alternatively, the material may be passed from the saponifying solution directly into the dye without previous drying. Examples of the process are given in detail.

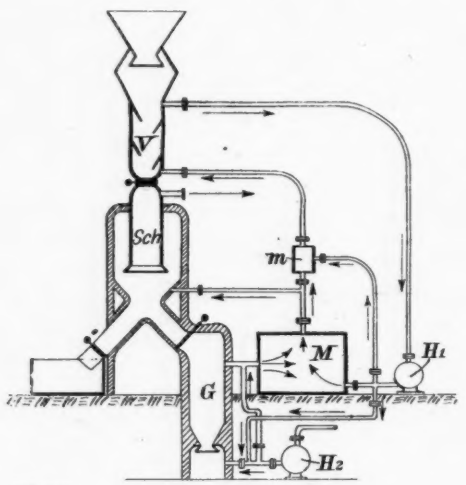
169,758. Colloidal Metallic Elements and Compounds Thereof, Method of Preparing. Chemische Fabriken Dr. Kurt Albert and L. Berend, Landgrabenweg 14, Amöneburg, near Biebrich-on-Rhine, Germany. Application date, June 3, 1920.

The process is for obtaining metals such as copper, silver, mercury, cerium, arsenic and antimony, and insoluble compounds of these in the colloidal state. This is effected by treating the elements or their compounds at temperatures above 100°C. with waste liquor obtained in the manufacture of cellulose from wood, preferably waste sulphite liquor or waste soda lye. When reducible compounds of the metals are employed as starting materials, the cellulose waste liquor may also act as a reducing agent. In this case the acid set

free is neutralised by adding alkali or alkaline earth. In one example 100 parts of copper sulphate are dissolved in 400 parts of waste sulphite liquor, and the solution is neutralised with lime or barium hydrate and filtered. The filtrate is mixed with 100 parts of soda lye and heated to 100°C. until the precipitated copper hydroxide is converted into colloidal copper oxide. Prolonged heating converts the oxide into colloidal metallic copper. Other examples are given of the production of colloidal mercury and silver. The colloidal products may be further separated from the salt solution by precipitation with alcohol or by dialysis. An additional reducing agent such as sulphuretted hydrogen may also be employed in addition to the waste liquor, *e.g.*, in the production of colloidal arsenic sulphide. These colloidal solutions have very strong fungicidal properties, and in such cases are preferably used by adding them in small proportions to substances such as copper-lime liquor, aluminium hydrate, gypsum, barium carbonate, lime, &c. The colloidal solutions may also be used for tanning, the preservation of wood, and for medicinal purposes.

169,847. Drying and Carbonisation of Lignite and the Like for the Production of a Tar Rich in Undecomposed Bitumen. F. Seidenschnur, 10, Ilmenauerstrasse, Berlin Grunewald, Germany. Application date, July 15, 1920.

The production of tar from bituminous substances such as lignite is usually accompanied by the generation of large quantities of combustible gases by the decomposition of the bitumen. It is now found that the production of gas may be practically avoided by first drying the lignite and then



169,847

treating it with a large quantity of gas at a temperature below 500°C. The wet material is delivered to a drying apparatus V, from which it passes to a carbonising apparatus, *Sch*. The coke from the latter passes to a producer G, where it is partly gasified. The gas passes into a chamber M, where it is mixed with waste gas and steam which is drawn from the dryer V by a high pressure blower H_2, and delivered to the mixing chambers M, *m*. Compressed air for combustion is supplied by the blower H_2 to the producer G, together with steam and gas from the blower H_1. The hot gases delivered to the carbonising apparatus *Sch* should be at least 3 cubic metres per kilogram of dry lignite, and the tarry gases produced are drawn off at the top. The direction of the circulation of gases in the apparatus is shown by the arrows. A suitable form of drying apparatus and carbonisation apparatus consists of a series of inclined stepped grates contained in a vertical retort.

169,763. Hydrocarbon Oils, Process of Distilling. M. Benson, La Salle Hotel, Chicago, Ill., U.S.A. Application date, June 7, 1920.

The process is for treating substances containing volatile hydrocarbons such as crude oils, crude oil emulsions, asphalts and tar sands. In the usual method of distilling heavy crude oils, such as Mexican and Californian, the process is a lengthy one, and there is usually a residue of about 40 per cent. of asphalt or 20 per cent. of coke, besides considerable loss of gas. In the present process no asphalt, and only a small amount of coke are obtained, and very little gas is formed. The crude oil is delivered simultaneously with super-heated steam or other heating medium to a mixing chamber, and the mixture is sprayed into a vaporising chamber in which non-volatile matter is precipitated. The vapour then passes through a condenser and the liquefied product is separated. The steam is preferably under a pressure of 100 lb. and temperature of about 750°F., and the oil is vaporised instantaneously, while cracking is avoided. In an application of the process to Mexican crude oil of 10.5°Bé., it is possible to obtain about 81 per cent. of undecomposed liquid distillate, consisting principally of gas oil, as compared with about 60 per cent. with ordinary direct distillation.

169,573. Lubricating Greases, Manufacture of. R. Maclaurin, Homesteads, Stirling, and Scottish Bye-Products, Ltd., Grangemouth, Stirling. Application date, July 24, 1920.

Crude oil obtained by the low temperature carbonisation of coal is treated with dilute sulphuric acid and alkali in succession to remove bases and phenols, and the lighter oil thus obtained, with or without preliminary heating to 200°C., is subjected to treatment with a very dilute solution of mineral acid. In an example 7 parts of the oil are slowly stirred into 2.5 parts of hydrochloric acid of 5 per cent. strength. 14 parts of sodium nitrite of 3 per cent. strength are then slowly stirred into the mixture which thickens into a stiff grease which is particularly suitable for lubricating purposes.

169,764. Copper, Manufacture of. E. E. Naef, 16, Loughborough Road, West Bridgford, Nottingham. Application date, June 19, 1920.

Precipitated copper sulphide, or very finely-ground sulphide from copper ore, may be reduced to metallic copper by heating to 250°-400°C. with caustic soda of 80-90 per cent. Caustic potash may also be used with or without sodium carbonate, sodium chloride, sodium sulphate, calcium oxide, or hydroxide. A small proportion of finely-divided coal and/or hydrogen may also be used to assist the reduction. The mixture obtained is extracted with water to dissolve the sodium salts formed, and the reduced copper is filtered off. The metal may be refined electrolytically, or by heating to form the oxide and converting the latter into sulphate. Reference is directed in pursuance of section 7, sub-section 4 of the Patents and Designs Acts, 1907 and 1919, to Specification No. 624/1871.

169,829. Shellac-Like Products, Manufacture of. E. A. Muskett, 13, River View, Chase Side, Enfield, Middlesex. Application date, July 8, 1920.

The process is for producing substitutes for different types of shellac, such as button shellac, leaf shellac, or garnet shellac. The material consists essentially of spirit copal with about 6-8 per cent. of oleine. In an example a substitute for button shellac consists of macassar or manila copal, 248 lb.; Australian oleine, 16 lb.; pine rosin, 12 lb.; candelilla wax, 10 lb.; wax brown dye, 10 oz.; and wax amber dye, 6 oz. Leaf shellac is obtained by increasing the quantity of candelilla wax, and garnet shellac by omitting the wax.

169,863. Azo Dyestuffs and Intermediate Products, Manufacture of. O. Y. Imray, London. (From the Society of Chemical Industry in Basle, Switzerland.) Application date, July 23, 1920.

The process is for producing monoacidyl derivatives of diamino-diarylsulphones derived from phenylene-diamines or naphthylene-diamines. Such products are used as intermediates in the manufacture of azo dyestuffs. In an example, 2:5-diamino-benzene-1-paratoluene-sulphone is dissolved in alcohol, ethyl acetate or dilute acetic acid, and acetic anhydride is then added. The acetyl derivative is precipitated and may be recrystallised from acetone. Other examples are given of the treatment of 2:5-diamino-benzene-1-paratoluene-sulphone to produce mono-benzoyl-2:5-diamino-benzene-1-paratoluene-sulphone and the monophthalamic acid of 2:5-diamino-benzene-1-paratoluene-sulphone, the acidylating agent in the latter case being phthalic anhydride. These products may be diazotised and coupled in acid liquid with -naphthylamine, its derivatives and substitution products to obtain dyestuffs which dye wool in an acid bath and without mordants. Numerous examples of such dyestuffs are given.

169,870. FILTERING LIQUIDS, APPARATUS FOR. F. Bloor, 14, Herbert Street, Blackley, Manchester. Application date, July 30, 1920.

The filter is of the kind in which a drum rotates in the liquid to be filtered, and is provided with a perforated periphery surrounded by a filtering fabric, while means are provided for maintaining a vacuum in the drum. In such apparatus it is usually difficult to keep the outside of the fabric sufficiently clear of deposited solid matter to permit continuous filtration, and the object is to avoid this difficulty. The cylindrical surface of the drum is composed of a number of parallel bars *b* of V-shaped cross section, with the widest surface c^1 towards the interior of the drum. The shell of the drum is perforated at d^1 between the bars, and is surrounded by fabric *e*. A vacuum is maintained within the drum and solid matter is

Fig. 2

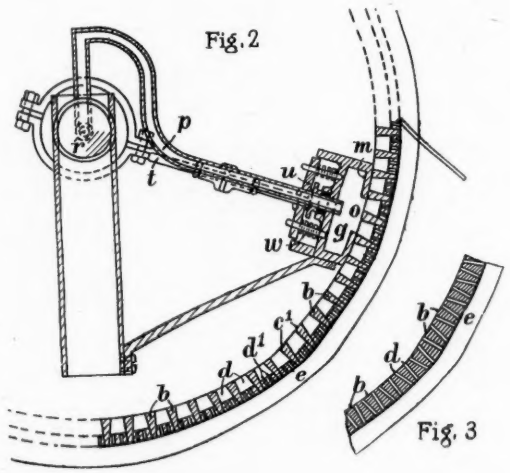


Fig. 3

169,870

deposited on the exterior. A modified form of drum surface is shown in Fig. 3, having perforations *d* forming V-shaped bars. The chamber *g* having one open side, *o* is maintained with its flanges *m* pressed closely against the drum, and is supported in a fixed position by arms *t*, which support a fixed plate *u*. The chamber *g* is pressed resiliently against the drum by springs *w*. The interior of the chamber is connected by the pipe *p* and axial pipe *r* with a source of liquid or gas under pressure, so that every section of the drum is subjected to internal pressure once in a revolution. Any solid matter not removed by the external scraper is thus detached by the pressure fluid, so that the filtering fabric is kept clean and filtering may be carried on continuously at maximum efficiency.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 141,058 (C. Moureu and C. Dufraisse) relating to polymerisation products of acrolein, *see* Vol. II., p. 644; 143,873 (Union Carbide Co.) relating to calcium carbide, *see* Vol. III., p. 163; 146,411 (C. Wehmer) relating to fumaric acid, *see* Vol. III., p. 354; 146,427 (Badische Anilin and Soda Fabrik) relating to tanning materials, *see* Vol. III., p. 354; 146,472 (Standard Oil Co.) relating to decomposition of petroleum, *see* Vol. III., p. 354; 146,819 (Mitsubishi Kogyo Kabushiki Kaisha) relating to synthetic cyanides, *see* Vol. III., p. 381; 146,898 (M. Melamid) relating to lubricating oils from tar oils, *see* Vol. III., p. 381; 147,030 (E. H. Westling) relating to manganese dioxide, *see* Vol. III., p. 403; 147,094 (J. Thede) relating to sulphuric acid manufacture, *see* Vol. III., p. 404; 147,173 (J. Filhol) relating to phenol-formaldehyde condensation products, *see* Vol. III., p. 405; 147,752 (W. P. Thompson) relating to white lead, *see* Vol. III., p. 430; 147,909 (T. Goldschmidt Akt.-Ges. and F. Bergius) relating to ethylene chloride, *see* Vol. III., p. 455.

International Specifications not yet Accepted

168,835. GLYCERINE. E. Barbet et Fils et Cie., 5, Rue de l'Echelle, Paris. International Convention date, September 29, 1916.

Waste liquor from alcoholic fermentation is neutralised with lime or chalk, filtered, and boiled under pressure with ferric chloride until no reaction is given with Fehling's solution. Alternatively, ferric sulphate may be used. Lime or baraty is then added to precipitate the iron, and sodium carbonate to precipitate the lime. The precipitate is filtered out and the solution then distilled to obtain glycerine.

168,838. PLASTIC COMPOSITIONS. Soc. Anon. des Etablissements. J. Dupont, Argenteuil, Seine-et-Oise, France. International Convention date, July 31, 1917.

The flexibility and durability of films, &c., having a basis of cellulose acetate may be varied by adding a mixture of ortho- and para-oxy-benzylic alcohols, and acetic acid.

168,902. AMMONIA SYNTHESIS. Norsk Hydro-Elektrisk Kvaelstofaktieselskab, 7, Solligaten, Christiania, Norway. International Convention date, September 7, 1920.

A complex cyanide such as potassium ferro- or ferri-cyanide is treated with a metallic salt to produce a double cyanide. The cyanide should be in excess and the product freed from soluble non-complex salts by washing. The product is suitable as a catalyst for ammonia synthesis.

169,145. ANTHRAQUINONE. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, September 13, 1920. Addition to 156,538.

Specification 156,538 (*see* THE CHEMICAL AGE, Vol. IV., p. 376) describes a process for manufacturing anthraquinone from anthracene and oxygen, in the presence of a water-fixing agent, and a nitric oxide catalyst. It is now found that the anhydrous acid medium such as anhydrous acetic acid and the water-fixing agent such as acetic anhydride may be dispensed with when the catalyst is a nitrite. If nitric oxide or fuming nitric acid is used, a fixing agent such as sodium acetate must be added.

169,147. HARDENING OILS. W. P. Heskett, Waiotahi Creek, Thames, New Zealand. International Convention date, September 17, 1920.

The hydrogenation of unsaturated oils is effected by treating with a material which is both a hydrogenating agent and a catalyst. The material used is an alloy composed of ferro-manganese, aluminium, antimony, nickel, and lead, which, when added to oil or a mixture of oil and water, is stated to liberate hydrogen.

168,867. WASHING GASES. P. Kestner, 7, Rue de Toul, Lille, France. International Convention date, September 9, 1920.

The washing liquid is supplied by a pipe 6, to one or more paddle wheels 1, having radial blades 2. A spray of liquid is obtained, the amount of dispersion *a* depending on the

FIG. 1.

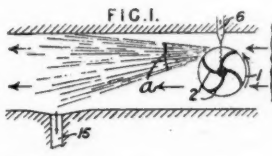
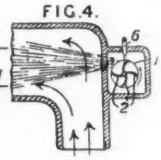


FIG. 4.



168,867

direction of the curvature of the blades 2. Gas is drawn through the conduit by the jet, and liquid is withdrawn through the outlet 15. A modified form is also described in which the paddle wheel 1 is placed in a separate compartment as shown, to avoid contact with corrosive gases.

169,177. SEALING WAX SUBSTITUTES. A. Bulling and K. Rees, 21, Klugstrasse, Munich, Germany. International Convention date, September 16, 1920.

A pasty or viscous material which is suitable as an adhesive or sealing material, is made by mixing celluloid with a solvent such as acetone, ether, alcohol, amyl acetate, benzene, chloroform, carbon disulphide, or carbon tetrachloride.

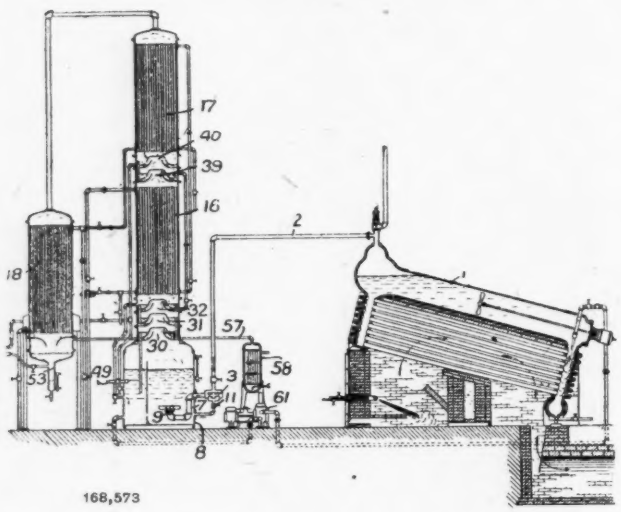
169,182. CRACKING OILS. E. Barbet et Fils et Cie., 5, Rue de l'Echelle, Paris. International Convention date, June 22, 1917.

Oil is heated to 250°-350°C. and a current of steam passed through it. The resulting mixture of oil vapour and steam is passed over a heated catalyst to produce lighter oils. The temperature of the oil determines the proportions of oil vapour and steam in the mixture.

169,185. DIALKYLAMINOALKYL COMPOUNDS. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, September 17, 1920. Addition to 167,781.

To produce the dialkylaminoalkyl compounds described in specification 167,781 (*see* THE CHEMICAL AGE, Vol. V., p. 464) a mixture of halogen alkyldialkylamines or their salts, and substances having the general formula $R.CO.CH(R_1)X$, where X is an electronegative radical, is treated with caustic alkali. The preparation of several acetoacetic esters of such compounds is described.

The following illustration should have accompanied the abstract of Patent 168,573 (Cracking hydrocarbons) published in THE CHEMICAL AGE of last week (p. 569) :



168,573

Specifications Accepted, with Date of Application

147,715. Hydrocarbons, Process of distilling. Standard Oil Co. June 26, 1914.

149,001. Aluminium sulphate, Process of preparing. G. Muth. May 13, 1919.

152,298. Arsenical compounds. Lowy Laboratory Inc. October 4, 1919.

152,634. Dyestuffs of the indigo series. Soc. Chimique des Usines du Rhone (Anciennement Gilliard, P. Monnet et Cartier). October 14, 1919.

154,182. Concentrating, evaporating and dehydrating liquids by treatment with gases. P. W. Webster and V. K. Boynton. November 20, 1919.

156,583. Filtering, Apparatus for. Braden Copper Co. January 2, 1920.

170,323. Recovering gases which have been absorbed by solids. Thermal Industrial and Chemical (T.I.C.) Research Co., Ltd., and J. S. Morgan. May 21, 1920.

170,324. Fractional distillation, Method of and apparatus for. Thermal Industrial and Chemical (T.I.C.) Research Co., Ltd., and J. S. Morgan. May 21, 1920.

170,329. Urea from cyanamides, Process for producing. E. Lie and Aktieselskabet North Western Cyanamide Co. June 16, 1920.

170,351. Artificial resins, Manufacture and production of. J. Y. Johnson. (Badische Anilin & Soda Fabrik.) July 13, 1920. Addition to 146,498.

170,474. Fertilisers, Manufacture and production of. J. Y. Johnson. (Badische Anilin & Soda Fabrik.) September 8, 1920.

170,515. Gas and coke, Ovens for producing. H. Koppers. December 6, 1920.

170,525. Coke ovens. R. Cravau. January 4, 1921.

LATEST NOTIFICATION.

170,817. Process for the recovery of carbon-bisulphide in the working up of viscose. Kampf, A. October 28, 1920.

170,840. Process for the production of concentrated nitric acid. Norsk Hydro-Elektrisk Kvaelstofalkieselkab. October 27, 1920.

170,852. Apparatus for mixing liquids having different temperatures. Lévy, L. R. October 26, 1920.

170,867. Preparation of reduction products of nitro compounds of tetrahydronaphthalene and its derivatives. Schroeter, G., and Schrauth, W. March 16, 1916.

Applications for Patents

Atack, F. W. and Whinyates, L. Manufacture of dye-stuffs from carbazole. 29,074. November 2.

Bader, W., British Cellulose and Chemical Manufacturing Co., Ltd., Clavel, R., and Whitehead, T. L. Treatment of cellulose derivatives. 29,137. November 2.

British Dyestuffs Corporation, Ltd. Manufacture of phenyl glycine or compounds thereof. 29,289. November 3.

Dietrich, W. von. Process of manufacturing oxide of barium. 28,907. October 31.

Harms, F. R. Treatment of iron liquors containing zinc and sulphate of soda. 29,198. November 3.

Hoffmann-La Roche & Co., F., and Napp, H. R. Process for manufacture of a compound of isopropylallylbarbituric acid. 29,042. November 1.

Schatzkes, J. Process of purifying lactic acid. 29,034. November 1. (Germany, December 27, 1920.)

Schrauth, W. and Schroeter, G. Preparation of reduction products of nitro-compounds of tetrahydronaphthalene and its derivatives. 28,928. October 31. (Germany, March 16, 1916.)

Patents Court Cases

APPLICATIONS have been made under Rule 7 of the Patents and Designs Acts, 1907 and 1919, for the grant of licences to The British Alizarine Co., Ltd., Trafford Park, Manchester, in respect of the following patents :—2918/1909 (L. Haas) relating to derivatives of carbazole and dyestuffs formed therefrom ; 14,143/1909 relating to sulphide colours from carbazole derivatives ; 18,822/1909 relating to sulphide dyestuffs from carbazole ; 22,138/1910 and 27,051/1910 relating to indophenolic compounds and dyestuffs therefrom ; the last four are in the name of R. B. Ransford (L. Cassella & Co.).

Application has been made by British Dyestuffs Corporation, Ltd., under Rule 7 of the Patents (Treaty of Peace) Rules, 1920, for a licence in respect of Patent No. 17,417/1914, and 18,292/1914 (R. B. Ransford—L. Cassella & Co.) relating to new substances containing sulphur and new dyestuffs therefrom.

Application has also been made under section 24 of the Patents and Designs Acts, 1907 and 1919, for the following patent to be indorsed " Licence of Right " :—12,0378 (Vorsk Hydro-Elektrisk Kvaelstofaktieselskab) relating to the manufacture of concentrated nitric acid.

" Bedson Lectures " at Armstrong College

ON the evening of November 3 members of the Newcastle section of the Society of Chemical Industry attended a social gathering in the Drawing Room Café at the invitation of the Chairman, Dr. J. H. Paterson and Mrs. Paterson. A large number of prominent members of the section, including Professor Briscoe, the new professor of organic chemistry at Armstrong College, were present.

Professor Haworth, of Armstrong College, referred to the fact that the fund collected by Professor P. P. Bedson, late of the College at Newcastle for the joint lectures, was practically exhausted. There had been thirty-nine lectures delivered under that scheme, the inauguration of which was entirely due to Professor Bedson. He thought it would be a great pity if the lectures were to cease, and suggested they might be put on a more permanent basis by collecting a capital fund of two or three thousand pounds to be held in trust and the income devoted to the lectures.

To make the lectures more attractive and to get the best men to give them, he suggested that the lectures might be known as the " Bedson Lectures," or even that a Chair of Industrial Chemistry for Armstrong College might be instituted for the purpose, the lecturer giving the lecture for the year would then be granted the title of a Professor of Industrial Chemistry, or some such title. In any case, it was most desirable that something of the sort should be done to honour Professor Bedson.

Bristol University

In connexion with AN APPEAL FOR FUNDS, Bristol University has issued a pictorial record of its activities. No fewer than 172 illustrations are employed to tell the story of life at the University

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, November 10, 1921.

The past week has seen a steady, though quiet, demand for chemicals generally, and there is really no outstanding feature. The collapse of the German currency has had no effect upon markets generally on account of the new German export regulations whereby German manufacturers are only permitted to make sales in certain foreign currencies. On the whole the tendency of prices is decidedly firmer.

The export demand is a little better; in fact, there has been quite a brisk inquiry for certain lines.

General Chemicals

ACETONE is well supported, and prices are likely to go higher.

ACID ACETIC.—The firmer position is maintained, and with the clearance of stocks imported before the duty came into operation higher prices are expected.

ACID CITRIC remains uninteresting.

ACID FORMIC is quiet, but the undertone is quite firm.

ACID OXALIC is in poor demand, as consumers seem to have filled their requirements in view of the duty now in operation. In this case, also, the tendency is firm, and higher prices are expected as stocks diminish.

ACID TARTARIC is quiet and featureless.

ARSENIC is in good demand, and as many works have disposed of their production the tendency is upward.

BICHROMATES.—The demand for consumption appears to be rather better, although buyers are only interested in small parcels for prompt delivery.

BLEACHING POWDER.—Little seems to have come of the export inquiries which were in the market, and the continued slow demand is a serious matter for the makers.

COPPER SULPHATE is unchanged.

FORMALDEHYDE.—The improvement in the market is maintained; stocks are in steady demand.

IRON SULPHATE is unchanged.

LEAD ACETATE remains very slow; the market is overstocked.

LEAD NITRATE is featureless, and the tendency is in buyers' favour.

LITHOPONE has been in much more inquiry, but the turnover remains nominal.

POTASSIUM CARBONATE and CAUSTIC are unchanged.

POTASSIUM CHLORATE remains slow, but the undertone is perhaps a little better.

POTASSIUM PRUSSIATE is very firm indeed; stocks are small.

SODIUM ACETATE is inactive, but on account of the foreign position the intrinsic value of stocks is on the up-grade.

SODIUM CAUSTIC remains in active demand for export; price nominally unchanged.

SODIUM NITRITE is firmer, but business is on the small side.

SODIUM PHOSPHATE is unchanged.

SODIUM PRUSSIATE remains in good demand, and the market tends in sellers' favour.

Coal Tar Intermediates

Business during the last week has been on quiet lines, but on the whole the state of affairs continues more interesting than has been the case for some considerable time past.

ALPHA NAPHTHYLAMINE continues in fair demand at recent values.

ANILINE OIL AND SALT have been inquired for, and resale parcels are very scarce.

BENZIDINE BASE has been the object of some interest, and there are not large quantities available.

BETA NAPHTHOL continues an easy and uninteresting market.

DIMETHYLANILINE continues in good demand.

DIPHENYLAMINE is firm, but the price remains unchanged.

NITROBENZOL has been the object of some interest, and a small steady business is passing at recent values.

PARANITRANILINE has been inquired for.

RESORCIN continues a steady market.

SALICYLIC ACID is very firm at last quoted figures.

Coal Tar Products

The market is still quiet generally.

90's BENZOL is still very quiet at 2s. 7d. to 2s. 8d. in the Midlands and 2s. 10d. to 3s. in the South.

PURE BENZOL is very quiet at 3s. 6d. per gallon on rails.

CREOSOTE OIL is weaker, and business has been done at 7d. in the North and 8d. in the South.

CRESYLIC ACID remains quiet, and is quoted at 2s. 1d. to 2s. 2d. on rails for the Pale 97 to 99 per cent. quality, while Dark is worth 1s. 9d. to 1s. 11d.

SOLVENT NAPHTHA is rather weaker, and is worth about 2s. 8d. on rails in the Midlands and 2s. 11d. to 3s. in London.

NAPHTHALENE is quoted from £5 to £8 per ton f.o.r. for Crude qualities, while Refined are worth from £14 to £18 per ton.

PITCH.—Business remains slow, with little demand, and prices still have a downward tendency.

Sulphate of Ammonia

There are no new features to report. There is a steady demand for home trade and for export, and prices are unchanged.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d
Acetic anhydride	lb.	0	2	1	to	0	2	2
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	60	10	0	to	62	10	0
Acetic, 80% pure	ton	45	0	0	to	48	0	0
Arsenic	ton	95	0	0	to	100	0	0
Boric, cryst.	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	5	to	0	2	6
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	10	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	38	0	0	to	40	0	0
Lactic, 60 vol.	ton	40	0	0	to	43	0	0
Nitric, 80 Tw.	ton	38	0	0	to	40	0	0
Oxalic	lb.	0	0	8½	to	0	0	9
Phosphoric, 1.5	ton	45	0	0	to	47	0	0
Pyrogallic, cryst.	lb.	0	7	6	to	0	7	9
Salicylic, Technical	lb.	0	1	2	to	0	1	3
Salicylic, B.P.	lb.	0	1	6	to	0	1	8
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	5	to	0	1	6
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	37	10	0	to	40	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	15	0	0	to	16	0	0
Ammonia, anhydrous	lb.	0	1	10	to	0	2	0
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	45	0	0	to	47	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	0
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0

	Per	£	s.	d.		£	s.	d.
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	15	0	0	to	16	0	0
Nitrate	ton	42	10	0	to	45	0	0
Barium Sulphate, blanc fixe, dry	ton	26	0	0	to	28	0	0
Sulphate, blanc fixe, pulp	ton	16	0	0	to	16	10	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
" " Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	22	0	0	to	23	0	0
Chloride	ton	8	10	0	to	9	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	85	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	29	10	0	to	30	10	0
Cream Tartar, 98-100%	ton	130	0	0	to	135	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	88	0	0	to	90	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	5	5	0	to	5	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	35	0	0	to	40	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	48	0	0	to	50	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	28	0	0
Magnesium chloride	ton	12	0	0	to	13	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	65	0	0	to	66	0	0
Nickel ammonium sulphate, double salt	ton	67	0	0	to	68	0	0
Potash, Caustic	ton	33	0	0	to	33	10	0
Potassium bichromate	lb.	0	0	7¾	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride	ton	36	0	0	to	38	0	0
Chlorate	lb.	0	0	5	to	0	0	5½
Meta bisulphite, 50-52%	ton	120	0	0	to	125	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	1	2	to	0	1	4
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	28	0	0	to	30	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6½	to	0	0	7
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	4¾	to	0	0	5
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	15	0	0	to	16	0	0
Nitrite, 96-98%	ton	40	0	0	to	42	0	0
Phosphate, crystal	ton	23	10	0	to	25	10	0
Perborate	lb.	0	1	6	to	0	1	7
Prussiate	lb.	0	0	8½	to	0	0	9
Sulphide, crystals	ton	17	0	0	to	18	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	10	0
Sulphite, cryst	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	80	0	0	to	85	10	0
Strontium Nitrate	ton	70	0	0	to	72	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	41	0	0	to	42	0	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	55	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	21	10	0	to	22	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	3	to	0	3	6
Alphanaphthol, refined	lb.	0	3	9	to	0	4	0
Alphanaphthylamine	lb.	0	2	6	to	0	2	8
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	6	to	0	1	7
Anthracene, 40-50%	unit	0	0	3½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	6	to	0	3	9
Benzidine, base	lb.	0	6	0	to	0	6	6
Benzidine, sulphate	lb.	0	6	6	to	0	7	0
Benzoic acid	lb.	0	2	3	to	0	2	6
Benzoate of soda	lb.	0	2	3	to	0	2	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	5	9	to	0	6	0
Betanaphthol	lb.	0	2	3	to	0	2	6
Betanaphthylamine, technical	lb.	0	9	0	to	0	9	6
Croceine Acid, 100% basis	lb.	0	4	6	to	0	5	0
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	3	9	to	0	4	0
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	8	0	to	0	8	6
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	6	to	0	7	0
Monosulphonic Acid (2.7)	lb.	0	7	0	to	0	7	6
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	9	to	0	5	0
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	12	0	to	0	12	6
Para-amidophenol, hydrochlor	lb.	0	12	6	to	0	13	0
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	4	6	to	0	4	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	3	9	to	0	4	0
Resorcin, technical	lb.	0	5	0	to	0	5	6
Resorcin, pure	lb.	0	8	0	to	0	8	6
Salol	lb.	0	2	6	to	0	2	9
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

French Potash

The activity which developed in the potash trade on the reduction of prices has been fairly well maintained during the past few weeks. The restricted application of potash last year, when the prices were high, has, no doubt, proved to many that potash as a fertiliser constituent cannot safely be left out of account. Crops on light land suffered severely during the continuous dry weather which prevailed last season. The result has been a reaction in favour of potash-manuring on most of the arable land, and also on poor thin pastures where there is much need for potash fertilisers to foster root development.

Prices for the concentrated and more costly forms of potash show a downward tendency, as these grades are not so popular with large buyers. Importations of kainit and sylvinite meet a ready market and are in most cases sold *ex* ship. There is general uniformity in prices quoted by the different potash interests, despite the fact that the German sellers are taking full advantage of their depreciated rate of exchange.

Cornish China Clay Deposits

It is reported that China clay has been found near Redruth, Cornwall, where the tin mines have recently closed down. The discovery is reported to have been made under the auspices of the Unemployment Committee, which devoted a sum of money to prospecting the moorlands. Further pits will probably be sunk.

Company News

ANGLO-UNITED OILFIELDS.—The transfer books and register of members will be closed from November 7 to 29 for the purposes of reconstruction.

AMALGAMATED ZINC (DE BAVAY'S).—The dividend of 1s. per share already announced will be paid on November 24, less tax, to all members on the London register on November 2.

SALAR DEL CARMEN NITRATE SYNDICATE.—The directors announce an interim dividend of 5 per cent., less tax, on account of profits for the current year, against 3 per cent., paid in July, 1920.

SANTA CATALINA NITRATE CO.—A further dividend of 10 per cent., less tax, is announced, making 20 per cent., for the year to June 30 last.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Australia ..	Glassware	No. —
Toronto ..	Zinc oxide; sulphur; coal tar (refined); mineral rubber. Replies to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1	—
Fusio in the Tessin (Italian Switzerland)	Linseed oil: turpentine	—
Aleppo (Syria)	Chemicals; pharmaceutical products	—
Los Angeles..	China clay; ferro-alloys; ferro-manganese; ferro-silicon; gas coke	—

Tariff Changes

GERMANY.—A revised tariff of export duties, in many cases higher than those formerly in operation, came into force on November 1. The former rates apply, in certain cases, to goods for which an export licence was issued on or after November 1. Full particulars of the exceptions appeared in the Board of Trade *Journal* (November 3, page 469).

HUNGARY.—The following are among the goods which may now be imported into Hungary without licence: Pyrites; colouring earths, unrefined; certain dyeing and tanning materials; certain gums and resins; various wares of india-rubber and gutta-percha; hollow and other glassware; retorts, crucibles, muffles and similar articles; physical and industrial measuring instruments; and a large number of chemicals, varnishes, and colours. A full translation of the list appears in the Board of Trade *Journal* (November 3, pp. 469–471).

ROUMANIA.—The charges for storage in Customs warehouses, leviable after three days, are now fixed at 50 bani per 100 kilogs. gross per day for the first three days; 1 lei per 100 kilogs. per day for the next five days, and 2 lei per 100 kilogs. per day thenceforth. The prohibition on the exportation of iron pyrites is removed, but pyrites may only be exported under special authorisation and after internal requirements have been met.

Better Trade Figures

As we pointed out in our review of the September trade returns, the revival which began in June has still suffered no check. Although slow, the improvement has been steady, and is, moreover, general in character. Our exports for October, according to the Board of Trade Returns just issued, amounted to £62,265,379 as against £55,247,578 in the preceding month. Imports at £84,741,852 were £2,376,655 less, while re-exports at £10,385,614 were £1,790,970 more than the September figures. The October returns will be dealt with more fully in our next issue

Registration of Trade Marks

Comptroller General's Decision

MR W. TEMPLE FRANKS, Comptroller-General and Registrar of the Patent Office, has had before him an application from the British Glues and Chemicals, Ltd., of 15, 17, 19, Kingsway, London, for the registration of two trade marks numbered 409353-6 in classes 1, 2, 3, and 4. The marks consist of the word "Glukem," and the registration was opposed by Lyons' Ink, Ltd., of Manchester, on the grounds: (1) That they are the registered owners of the words "Clucine" and "Glucine," the former word being registered in class 39, and with other matter in class 1, "Glucine" being registered only in class 39; (2) that, apart from these registrations, the opponents have for more than thirty years placed on the markets large quantities of an adhesive preparation under the name of "Clucine" and "Glucine," which is used for stationery, photographic, and aeroplane purposes; and (3) that the word "Glukem" so nearly resembles the opponents' marks as to be calculated to deceive and to cause confusion and deception in the case of adhesive preparations.

Mr. Moritz, for the applicants, contended that the trade mark "Glukem" was intended for the whole range of goods in which the applicants dealt. They were a large and important combination dealing not only with glues, but in all chemical preparations, the word "Glukem" being formed from the first syllable of two words in their name. The mark would not be confined to adhesives only, and it was sufficiently distinct from the opponents' marks to prevent any deception or confusion. He pointed out that no registration was desired in class 39, which was the special class for mucilage or gum, and that the opponents would have been unable to register the word "Glucine" in class 1, as it was the trade name of oxide of beryllium. There was no desire whatever to interfere or compete with the opponents' monopoly of the words of which the syllable "glue" formed part.

Mr. Sebastian, for the opponents, said they did not desire to prevent the registration of the mark for chemicals or other goods, but only in respect of glue and other adhesives. Their preparation had been sold in large quantities for over thirty years past under both the names of "Clucine" and "Glucine," and the applicants' mark, if used on adhesives, would undoubtedly create confusion. It was a two-syllable word of a similar sound, and the confusion was rendered more probable inasmuch as the opponents' preparation was often asked for as "Glukine," "Glukose," and other varieties. The applicants' preparation would undoubtedly be used for some of the same purposes as their own "Glucine."

The Comptroller-General, in his considered judgment, said that after careful consideration of the facts of the case and the evidence adduced, he had come to the conclusion that the registration should be allowed. The applicants' mark was a general mark to be used on a wide range of goods, and was not intended to denote or to be used in connexion with any one special preparation. There did not seem to be any evidence that the applicants had any intentions of specially competing with the opponents' trade; and, although the goods of the opponents might in some cases be used for the same purpose, he thought upon the whole that there was a sufficient distinction between a gum or mucilaginous preparation and the glue preparations which the applicants proposed to manufacture. He had no doubt that in certain instances the opponents' word "Glucine" might be pronounced "Glukine" and in other ways, but he thought for the purpose of this decision it must be assumed that in ordinary practise the word would be pronounced in the natural way with a soft "c."

It was intimated that leave to appeal against the decision would be granted, but that the appeal must be made within a month.

Safeguarding of Industries Act Complaints

THE Board of Trade have received notice of complaint from the British Cellulose and Chemical Manufacturing Co., Ltd., that calcium carbide has been improperly excluded from the lists of articles chargeable with duty under Part I. of the Industries Act. The referee will hear the complaint on December 10. Complaint has also been received on behalf of the Incandescent Mantle Manufacturers' Association that incandescent-gas mantles have been improperly excluded from the lists of articles published by the Board. The hearing will be on December 3. The referee has postponed the date of the hearing of the Santonine complaint (see THE CHEMICAL AGE, Vol. V., p. 563) from November 12 to 26.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

ORMANDY, William Reginald, D.Sc., F.I.C., and MOORE, Harold, M.Sc.(Tech.), A.I.C., as consulting and analytical chemists, at 85, Deansgate Arcade, Manchester, under the style of Ormandy & Moore, by mutual consent as from September 30, 1921. Debts received or paid by H. Moore, who will continue the business.

Bankruptcy Information

BUSH, Emil Frederick, 38, Springfield Road, New Southgate, and carrying on business at 120, High Road, New Southgate, Middlesex, colour and chemical merchant. First meeting, November 14, 11 a.m., 29, Russell Square, London, W.C. 1. Public examination, November 23, 11 a.m., Court House, Upper Edmonton.

Notice of Intended Dividend

MOODY, William Edmondson, 3, Market Place, Driffield, East Riding of York, chemist and mineral water manufacturer. Last day for receiving proofs, November 26. Trustee, Walter George Hall (Buckley & Hall), Union and Smith's Bank Chambers, Silver Street, Hull.

Company Winding Up Voluntarily

JOHN BATTEN (CLAYTON), LTD. The assets having been sold to the Clayton Glue Works, Ltd., the company to be wound up voluntarily; and J. A. Porter, chartered accountant, of 10, Corporation Street, Manchester, has been appointed liquidator. Particulars of claims to liquidator by November 30. (This notice is formal, all known creditors having been paid in full.)

MASON & SONS, LTD. C. S. Woolridge, of Church Street, Dewsbury, appointed liquidator.

DEWSBURY DYEING AND CARBONIZING CO., LTD. Resolution to wind up passed November 1.

Bankruptcy Petition

HARDFAST PAINT AND CHEMICAL CO., LTD. A petition for the winding-up of this company has been presented by Excel Co., Ltd., a creditor, and is to be heard at the Royal Courts of Justice, Strand, on November 15.

Deed of Arrangement

STRICKLAND, Robert Henry, Linden, Queen's Drive, Mossley Hill, Liverpool, and MORRISON, Norman, 10c, Princes Road, Liverpool, trading at 67, Lord Street and The Refinery, Gateacre Brow, both Liverpool, as R. H. Strickland & Co., syrup refiners and merchants. Filed October 26. Trustee, R. T. Langdon, 43, Castle Street, Liverpool, chartered accountant. Secured creditors, £7,000; liabilities unsecured, £12,433; assets, less secured claims, £4,927.

Liquidators' Notices

TIMMINS DRUG STORES, LTD. (In voluntary liquidation.) Meeting of creditors at 60, Scarborough Street, West Hartlepool, on November 9, at 3 p.m. Notice of attendance to W. H. E. Sparks, 60, Scarborough Street, West Hartlepool, liquidator.

ROYLE DYEING CO., LTD. (In voluntary liquidation.) Meeting of creditors at the offices of Atkins & Booth, 76, Derby Street, Macclesfield, at 3 p.m., on Wednesday, November 16. Particulars of claims by December 17, to J. R. Atkins, of 76, Derby Street, Macclesfield, incorporated accountant, liquidator.

Receivership

GOWANA SOAP CO., LTD. J. D. Pattullo, of 65, London Wall, E.C.2, ceased to act as receiver on October 24, 1921.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

DOWSONS, LTD., 3, Market Place, Colne, chemists. £11 1s. 9d. September 30.

NICHOLAS, Mr. W. H. C., Byrom Villa, Southport Road, Ormskirk, chemist. £15 15s. 3d. September 27.

ROBINSON, William, 340, Caledonian Road, N.1, dyer and cleaner, £16 2s. 1d. September 26.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

ANGLO-ULTRAMARINE TRADING CO., LTD., London, W.C., general factors and agents, &c. Registered October 26, £10,000 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue £5,000; general charge.

AYRTON, SAUNDERS, & CO., LTD., Liverpool, manufacturing chemists, &c. Registered October 25, deed (supplemental to mortgage registered June 24, 1912, and deed registered January 29, 1918), increasing rate of interest payable on £12,500, to Refuge Assurance Co., Ltd., Oxford Street, Manchester; charged on land and buildings, at Hanover Street, Liverpool. *£41,300. May 28, 1921.

BELL (JOHN) & CROYDEN, LTD., London, W., chemical manufacturers, &c. Registered October 24, mortgage to London County Westminster and Parr's Bank, Ltd., securing all moneys due or to become due to the Bank; charged on certain properties, also general charge.

CHESHIRE GLUE AND CHEMICAL CO., LTD., Sandbach. Registered October 25, £2,500 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue £2,000; general charge. *Nil. June 1, 1921.

ENGLISH VELVET AND CORD DYERS ASSOCIATION, LTD., Manchester. Registered October 25, sub demise by way of additional security (supplemental to Trust Deed, dated March 31, 1900, securing £300,000 debenture stock); charged on land at Bayhall Common Road, Huddersfield. *£249,475. February 24, 1921.

FARNSWORTH (RICHARD), LTD., Lumsdale, bleachers and dyers, &c. Registered October 28, mortgage to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on Bank House and Oxford Stores, Lumsdale; also registered October 28, £4,500 debentures, to G. S. Marple, Manor House, Netheredge, Sheffield; general charge.

S. Fleming & Co., Ltd.

We are informed by S. Fleming & Co., Ltd., with reference to a paragraph under the head of "Bankruptcy Information" last week, that Mr. S. Fleming is not now trading as S. Fleming & Co., of 47, Mark Lane, E.C., having ceased to be connected with that business as from April 4 last, when the company was taken over by new management as a limited concern.

Nobel Prize in Physics and Chemistry

A correspondent of the Exchange Telegraph Co. quotes a rumour current in Berlin to the effect that Professor W. Nernst, the new Rector of Berlin University and the inventor of the Nernst lamp, is regarded as a possible recipient of the Nobel Prize in physics and chemical science.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2 :—

BEECROFT & PARTNERS, LTD., Norfolk House, 36, Cannon Street, Birmingham. Manufacturers and dealers in ferrous and non-ferrous metals, &c. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: F. J. Beecroft. Qualification of directors, one share.

CALTEX OIL CO., 68, Pall Mall, S.W. 1. To acquire lands with the exclusive right to prospect, and sink wells and shafts, to produce and transport oil, petroleum and gas, and carry on the business of storing, refining, manufacturing, buying and selling petroleum and other oil products and by-products. Nominal capital, 2,500,000 dollars in 2,500,000 shares of 1 dollar each. Name of person authorised to accept service: W. A. Read.

HUNTER (R. F.), LTD. Photographic chemists, &c, 9, Cavendish Circus, Buxton, and 3, The Promenade, Cheltenham. Nominal capital, £3,000 in 3,000 shares of £1 each. Directors: To be appointed by subscribers. Qualification of directors, one share. Subscribers: R. F. Hunter, Maud M. Hunter, E. Grundy.

HYGEIA, LTD., 85, Gracechurch Street, E.C. 3. Chemists and druggists. Nominal capital, £10,000 in 10,000 shares of £1 each. Directors: To be appointed by subscribers. Qualification of directors, £300.

KAYNEX MANUFACTURING CO., LTD. Manufacturers of polishes, dyes, &c., at Shaftesbury Avenue, High Street, Plaistow, Essex. Nominal capital, £2,000 in 1,000 preference shares and 1,000 ordinary shares of £1 each. Directors: F. G. Seares (Chairman), R. S. Goddard. Qualification of directors, 100 ordinary shares.

MITCHAM OIL AND PAINT CO., LTD., 49, Bankside, Southwark, S.E. 1. Manufacturers and dealers in oils, lubricants, paints, &c. Nominal capital, £2,500 in 2,500 ordinary shares of 10s. each, 2,000 ordinary shares. Directors: To be appointed by subscribers of 10s. each and 500 founders' shares of 10s. Qualification of directors: £100.

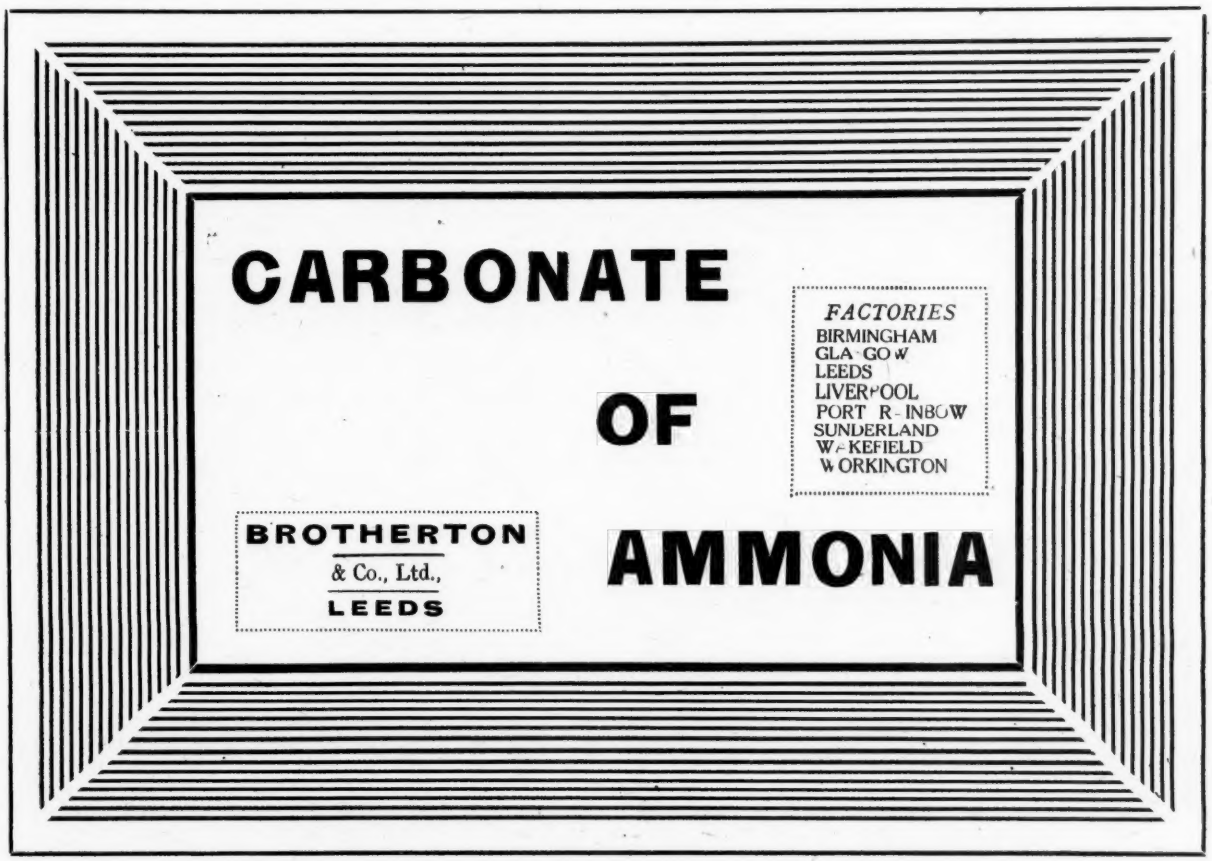
WESTERN CHEMICAL CO., LTD. Manufacturers and dealers in chemicals, glues, &c. Nominal capital, £3,000 in 2,000 ordinary shares of £1 each and 4,000 shares of 5s. each. Directors: To be appointed by subscribers. Qualification of directors, one share. Subscribers: J. S. Mason, W. J. Knight.

Twentieth Century Chemistry

A new series of volumes, to be published by George Routledge & Sons, Ltd., under the title "Twentieth Century Chemistry," is in preparation under the editorship of Sir William Tilden, Emeritus Professor in the Imperial College of Science and Technology, South Kensington, and Dr. J. C. Philip, Senior Secretary of the Chemical Society and Professor of Physical Chemistry in the Imperial College. The intention is to provide works of moderate size and price in all the more important sections of scientific chemistry, suitable for post-graduate readers and others possessing sufficient elementary knowledge. The aim will be to produce readable and interesting books which, without being exhaustive monographs, will furnish advanced students with a complete survey of the present state of knowledge and opinion in each branch of the science.

Institute of Physics

THE new board of the Institute of Physics is constituted as follows:—PRESIDENT: Sir J. J. Thomson; PAST-PRESIDENT: Sir Richard Glazebrook; VICE-PRESIDENTS: Professor W. H. Eccles, Professor C. H. Lees, Major E. O. Henrici and Mr. C. C. Paterson; TREASURER: Sir Robert Hadfield, Bart.; HON. SECRETARY: Professor A. W. Porter: NON-OFFICIAL MEMBERS OF THE BOARD: Inst.-Comm. T. Y. Baker, R.N., Mr. J. E. Barnard, Dr. R. S. Clay, Mr. W. R. Cooper. Professor C. L. Fortescue, Professor Andrew Gray, Dr. G. W. C. Kaye, Sir Charles Parsons, Mr. C. E. S. Phillips, Dr. E. H. Rayner, Professor S. Russ, Mr. F. E. Smith, Sir Napier Shaw and Mr. R. S. Whipple; SECRETARY: Mr. F. S. Spiers, 10, Essex Street, London, W.C. 2.



TRADE GUIDE

CHEMICAL AGE

THE Trade Guide is a compact and handy form of reference to a representative list of firms engaged in various branches of the Industry. In most cases fuller particulars may be found by referring to the displayed advertisement elsewhere.

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